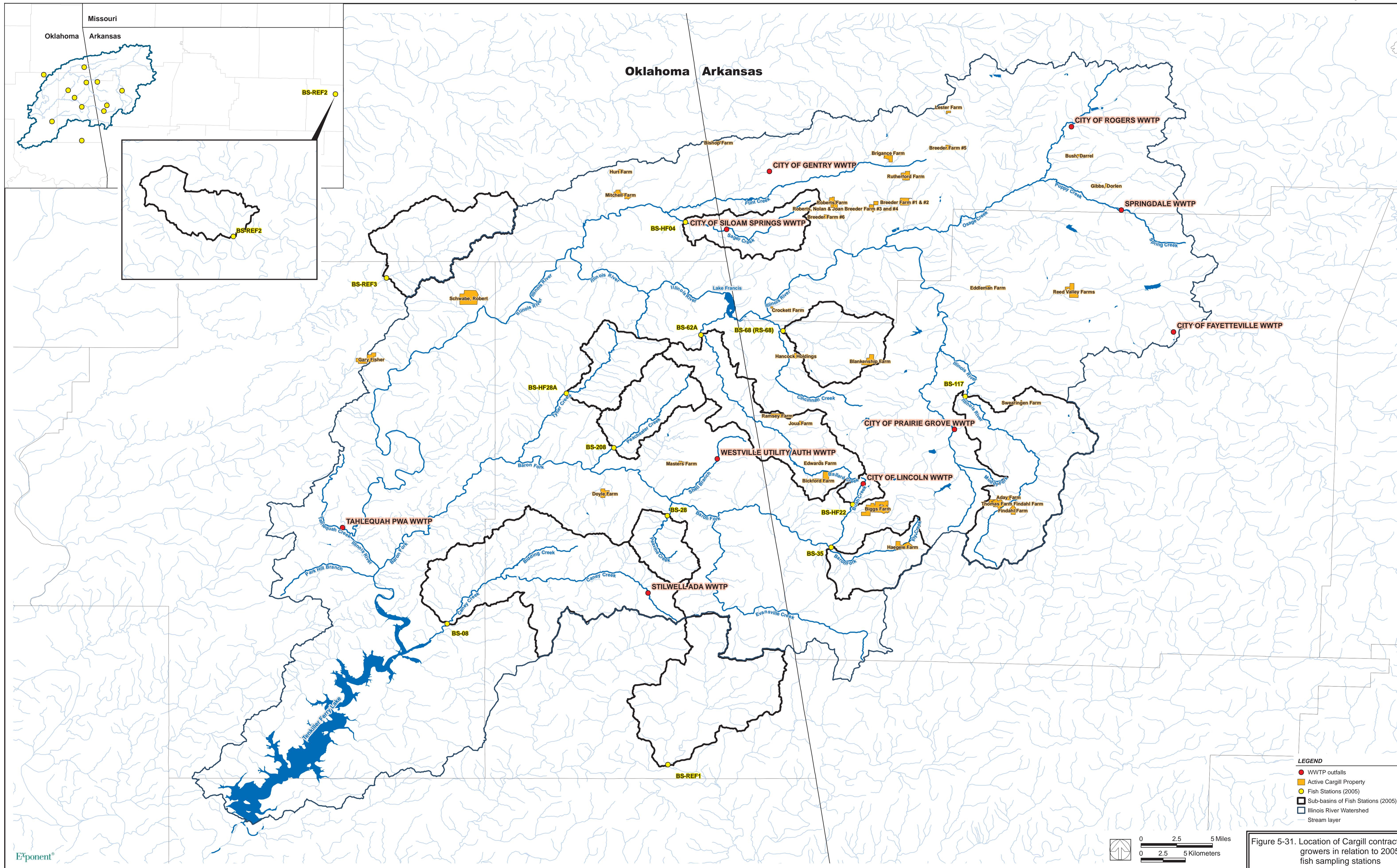
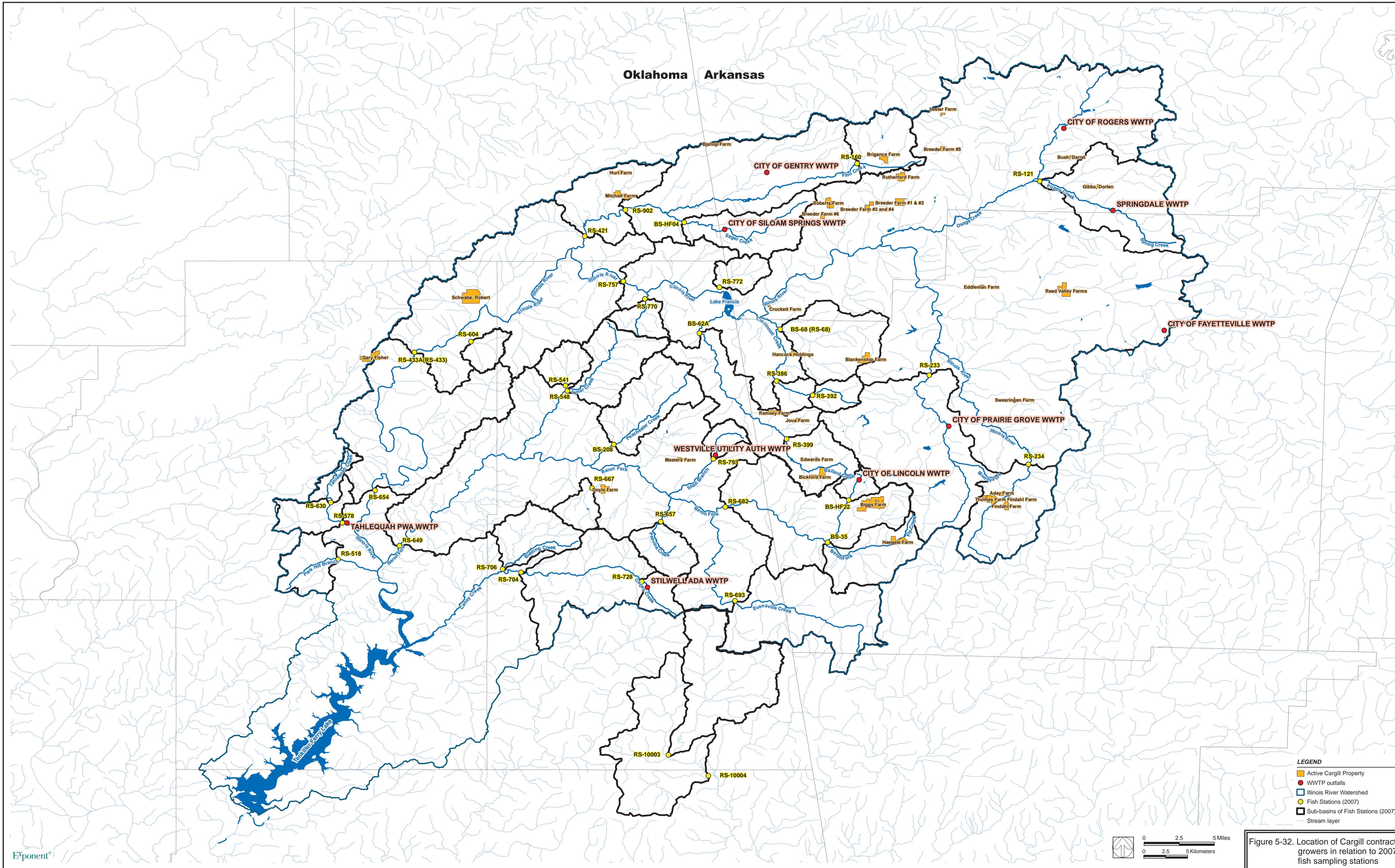


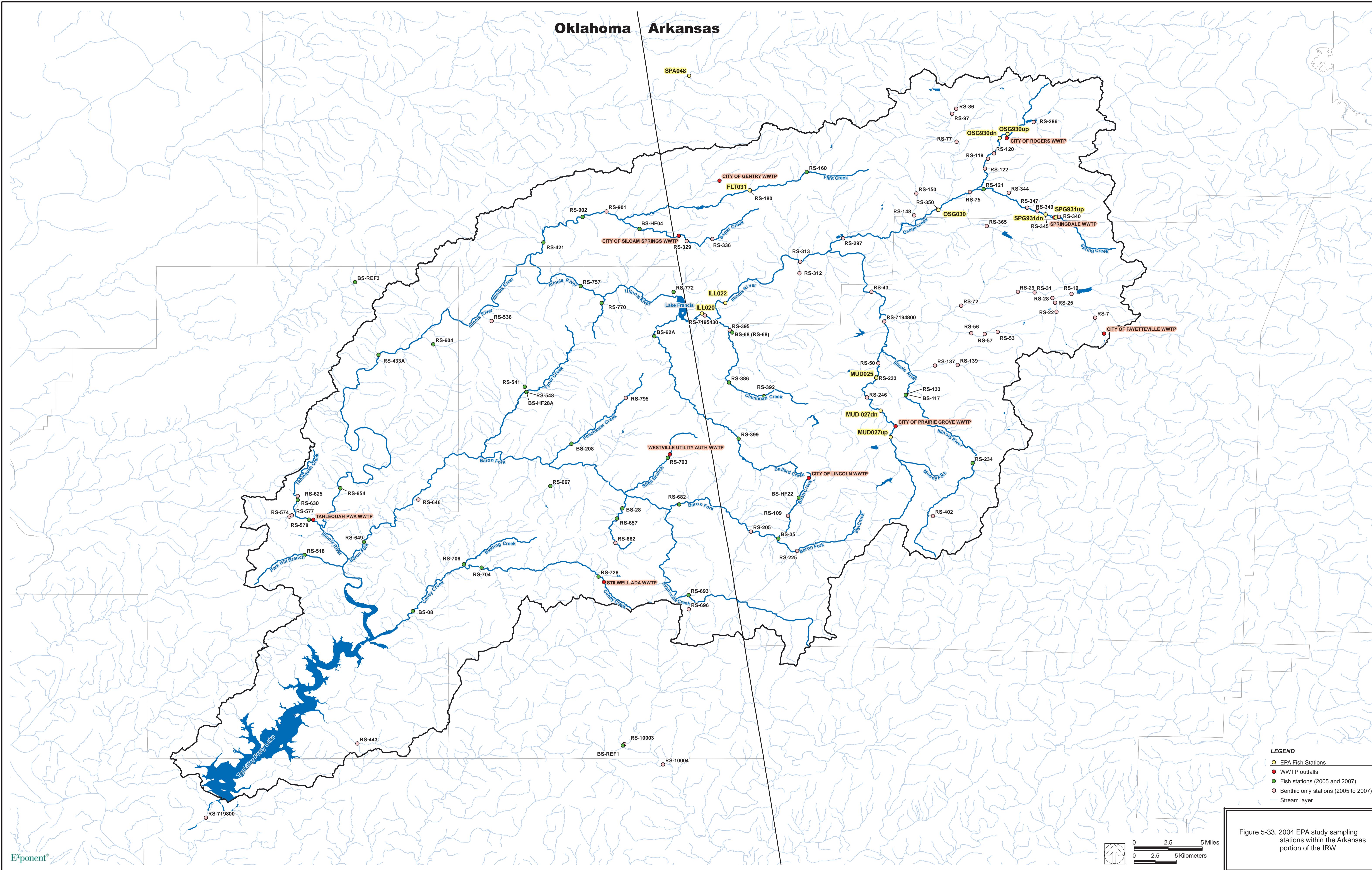
January 30, 2009



January 30, 2009



January 30, 2009



January 30, 2009

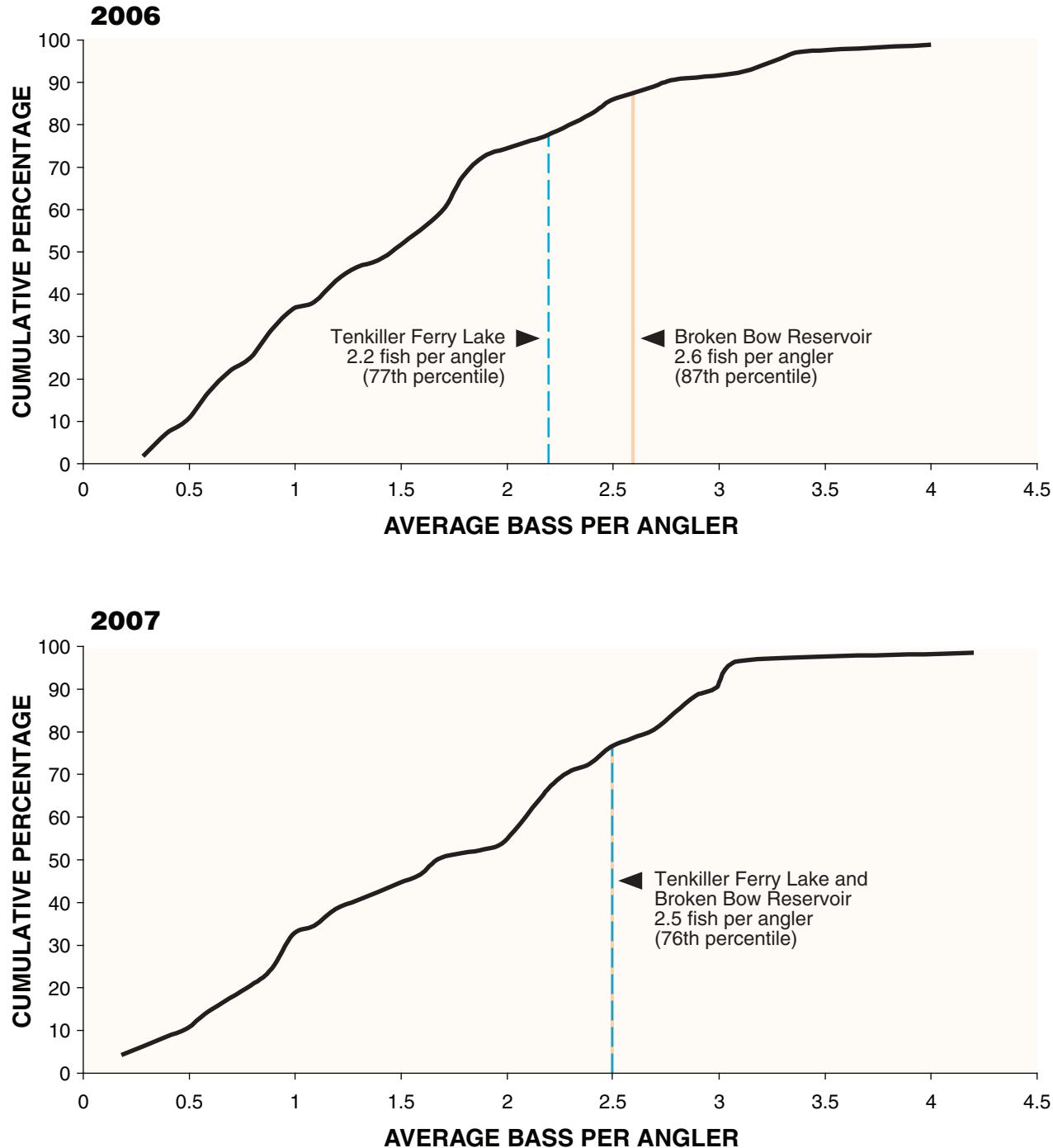


Figure 7-1. Comparison of the number of bass caught per angler at Broken Bow Reservoir and Tenkiller Ferry Lake to all Oklahoma lakes in 2006 and 2007

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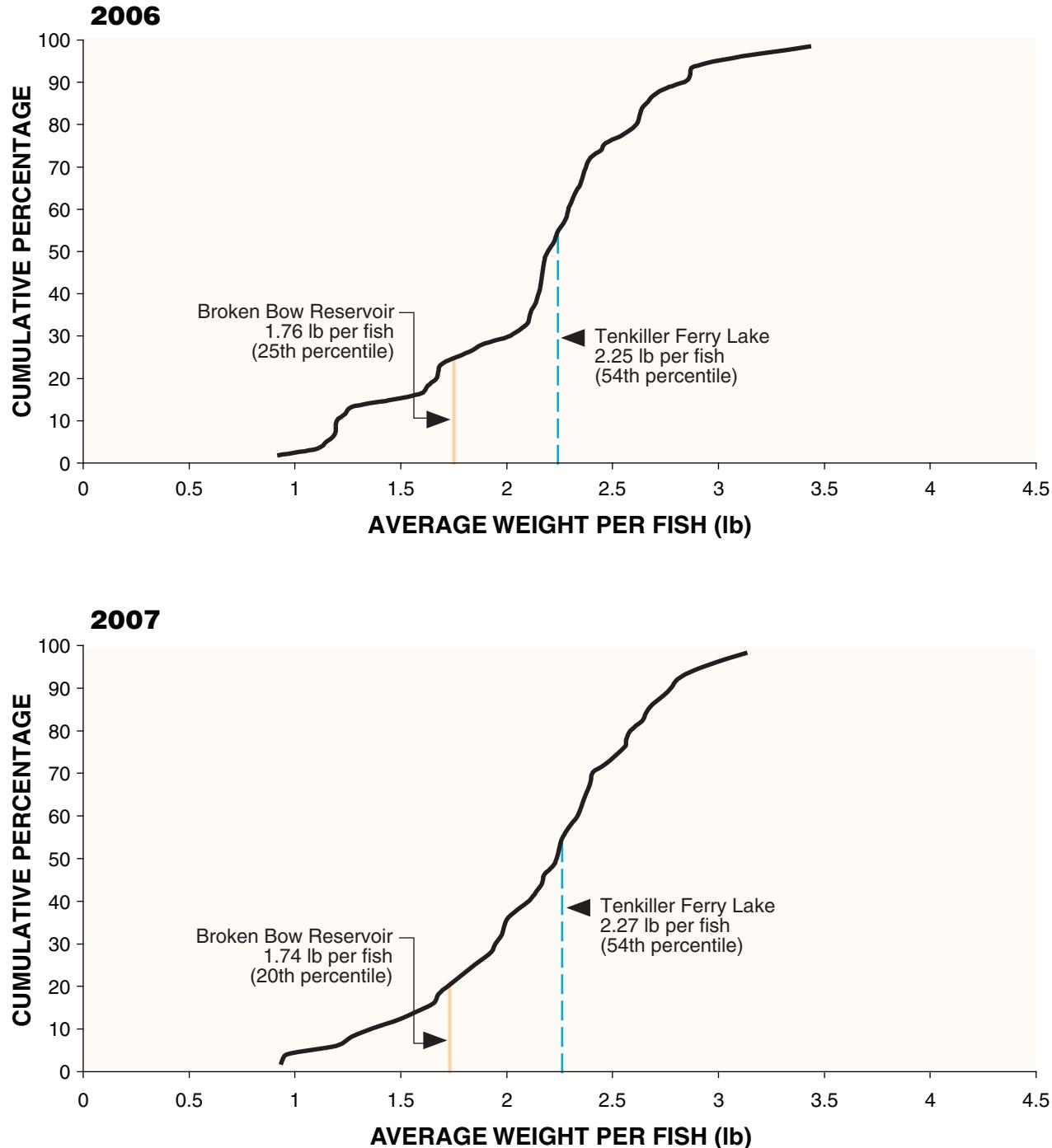


Figure 7-2. Comparison of the weight per fish caught at Broken Bow Reservoir and Tenkiller Ferry Lake to all Oklahoma lakes in 2006 and 2007

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## CPUE Gizzard Shad & Bass

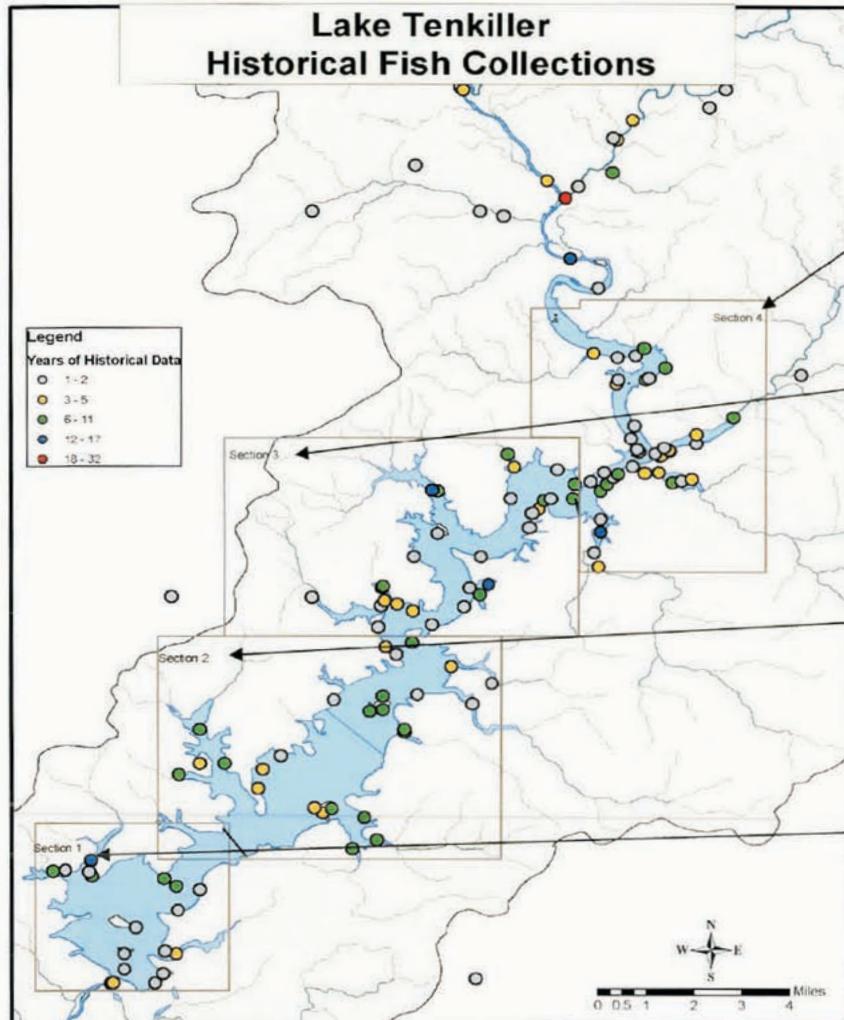
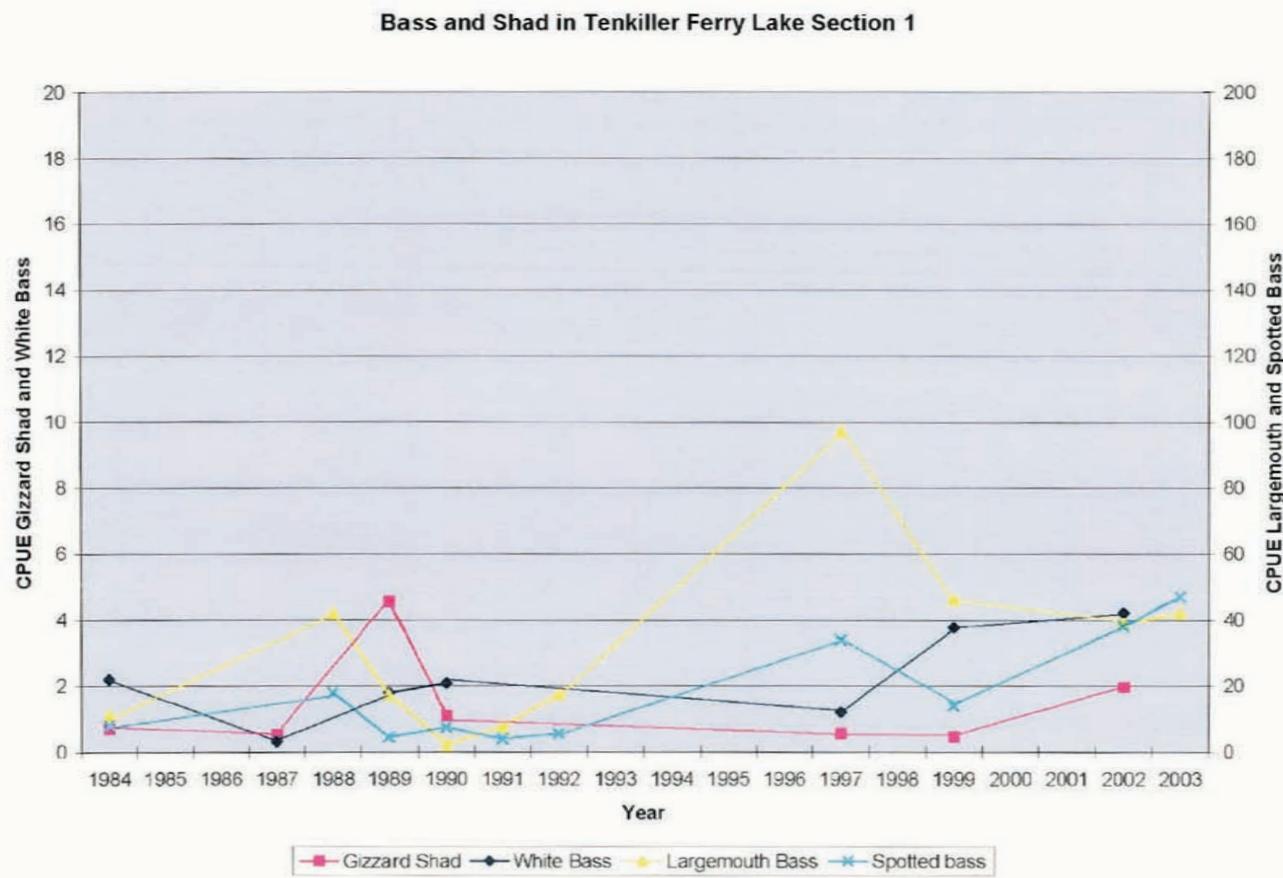


Figure 7-3. Locations of historical fish sampling stations on Tenkiller Ferry Lake (from CookeWelch00001565.002)

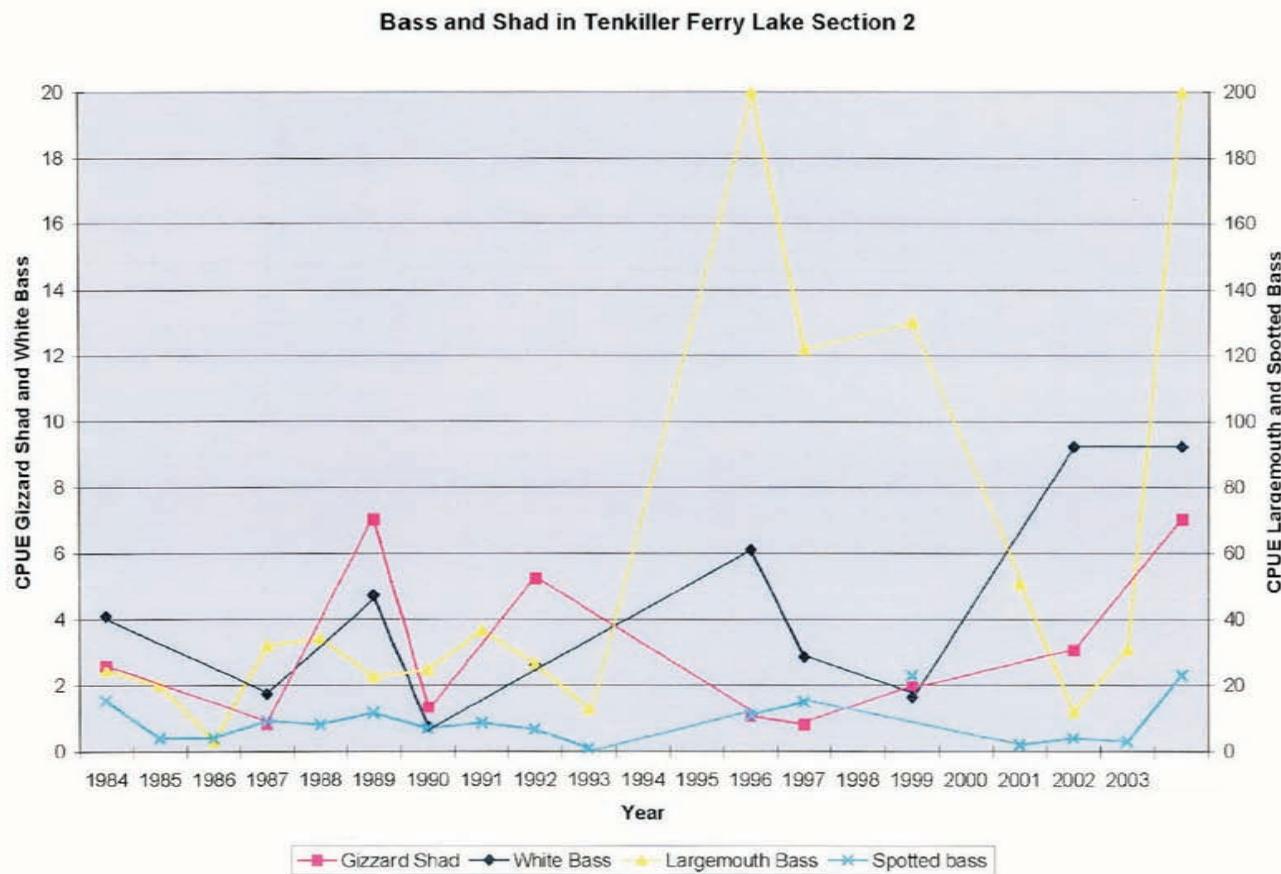
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Figure 7-4. Catch per unit effort of bass and shad in Section 1 of Tenkiller Ferry Lake (from CookeWelch00001565.003)

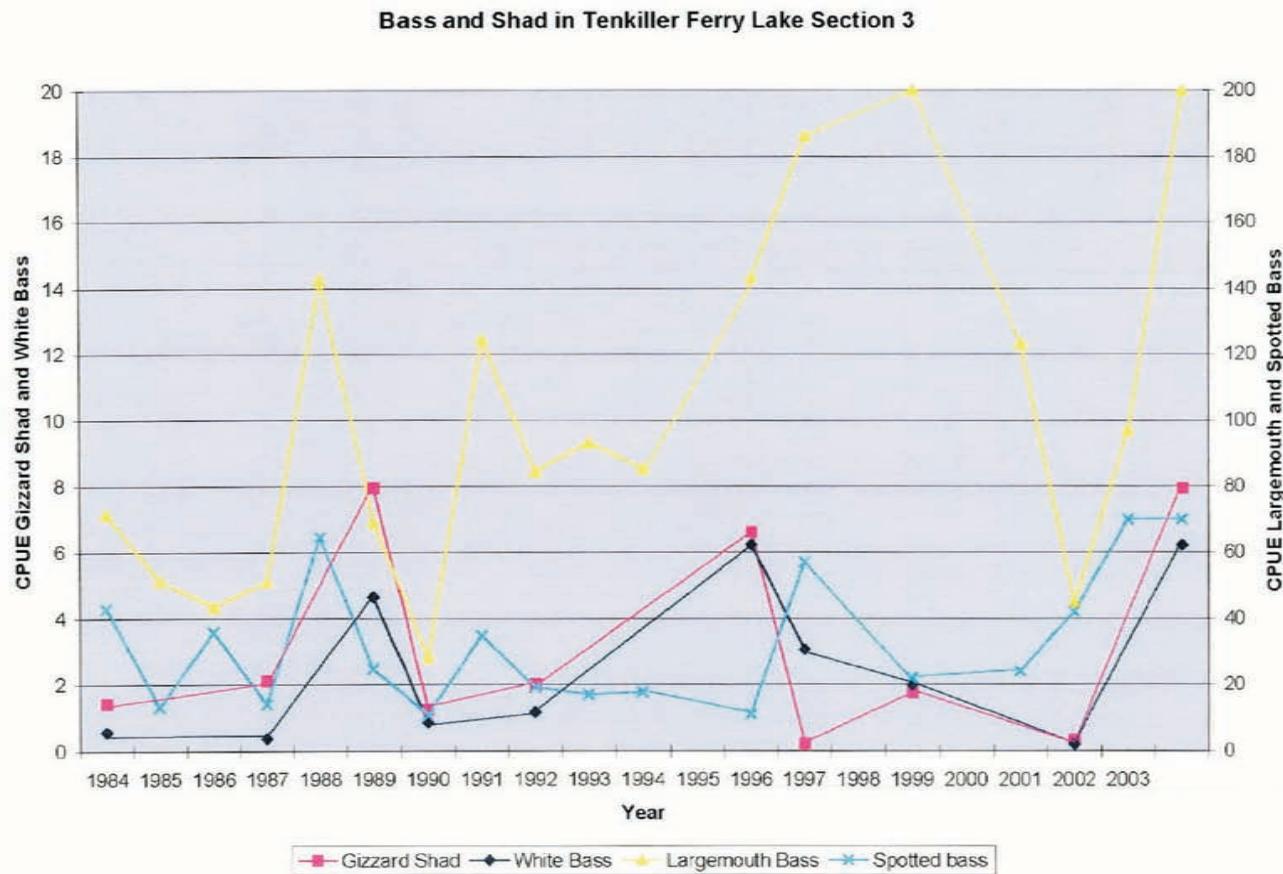
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Figure 7-5. Catch per unit effort of bass and shad in Section 2 of Tenkiller Ferry Lake (from CookeWelch00001565.004)

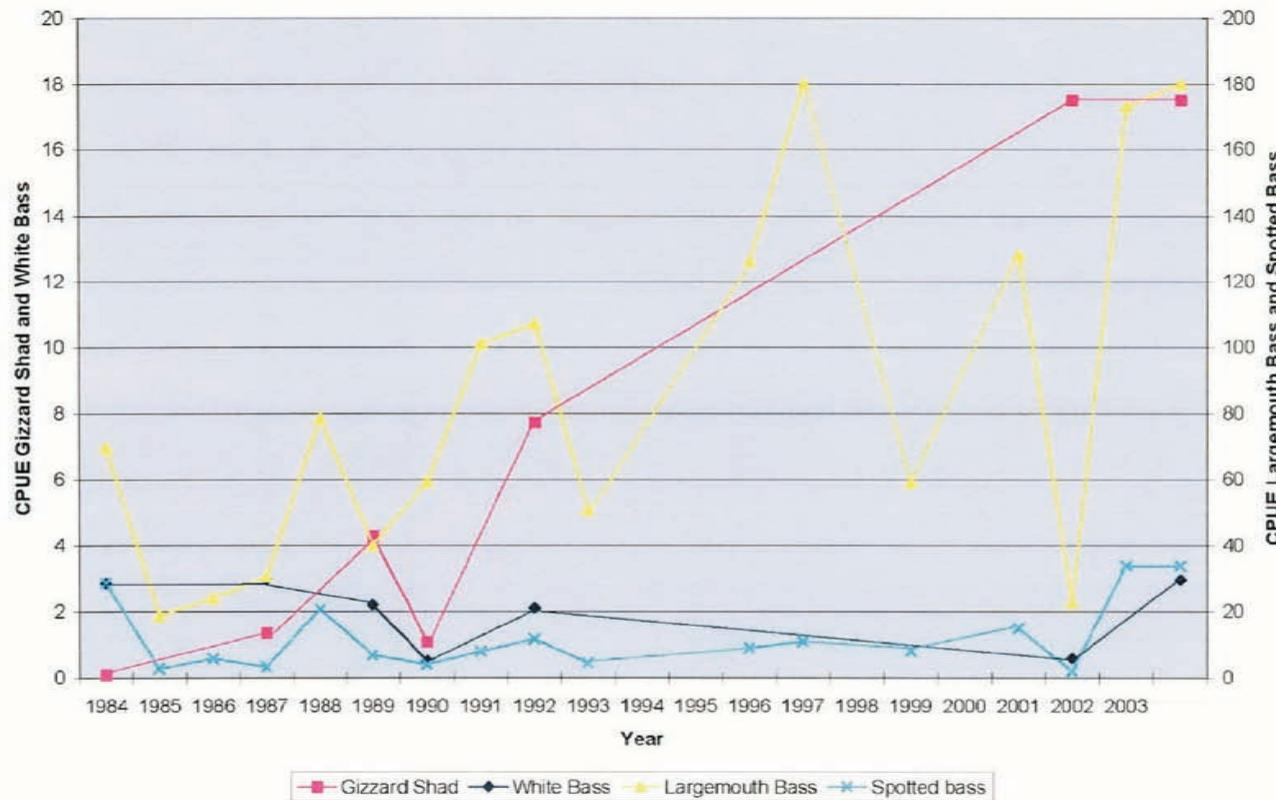
January 30, 2009



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Figure 7-6. Catch per unit effort of bass and shad in Section 3 of Tenkiller Ferry Lake (from CookeWelch00001565.005)

January 30, 2009

**Bass and Shad in Tenkiller Ferry Lake Section 4**

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Figure 7-7. Catch per unit effort of bass and shad in Section 4 of Tenkiller Ferry Lake (from CookeWelch00001565.006)

January 30, 2009

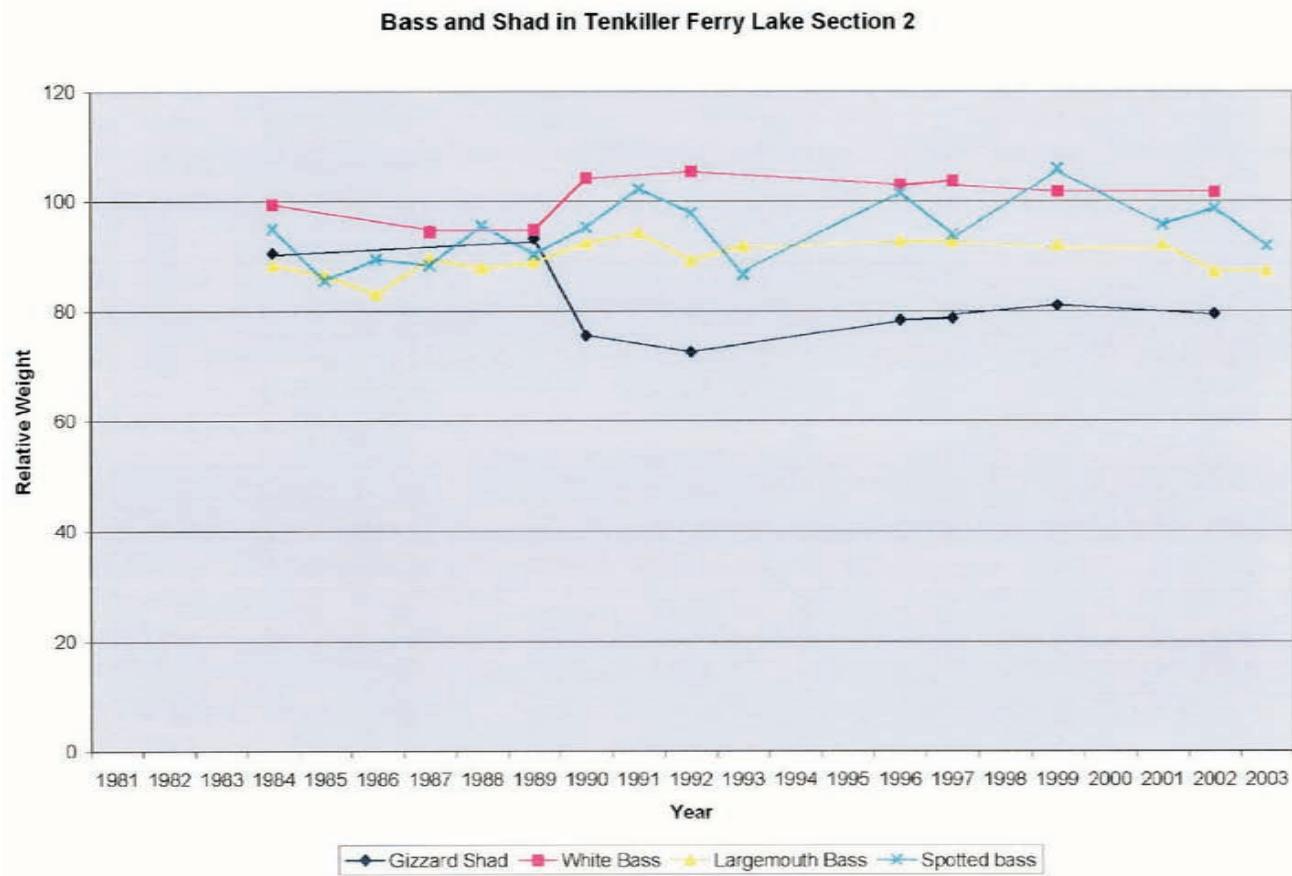


Figure 7-8. Relative weight (Wr) of shad and bass in Section 2 of Tenkiller Ferry Lake (from CookeWelch00001565.0010)

January 30, 2009

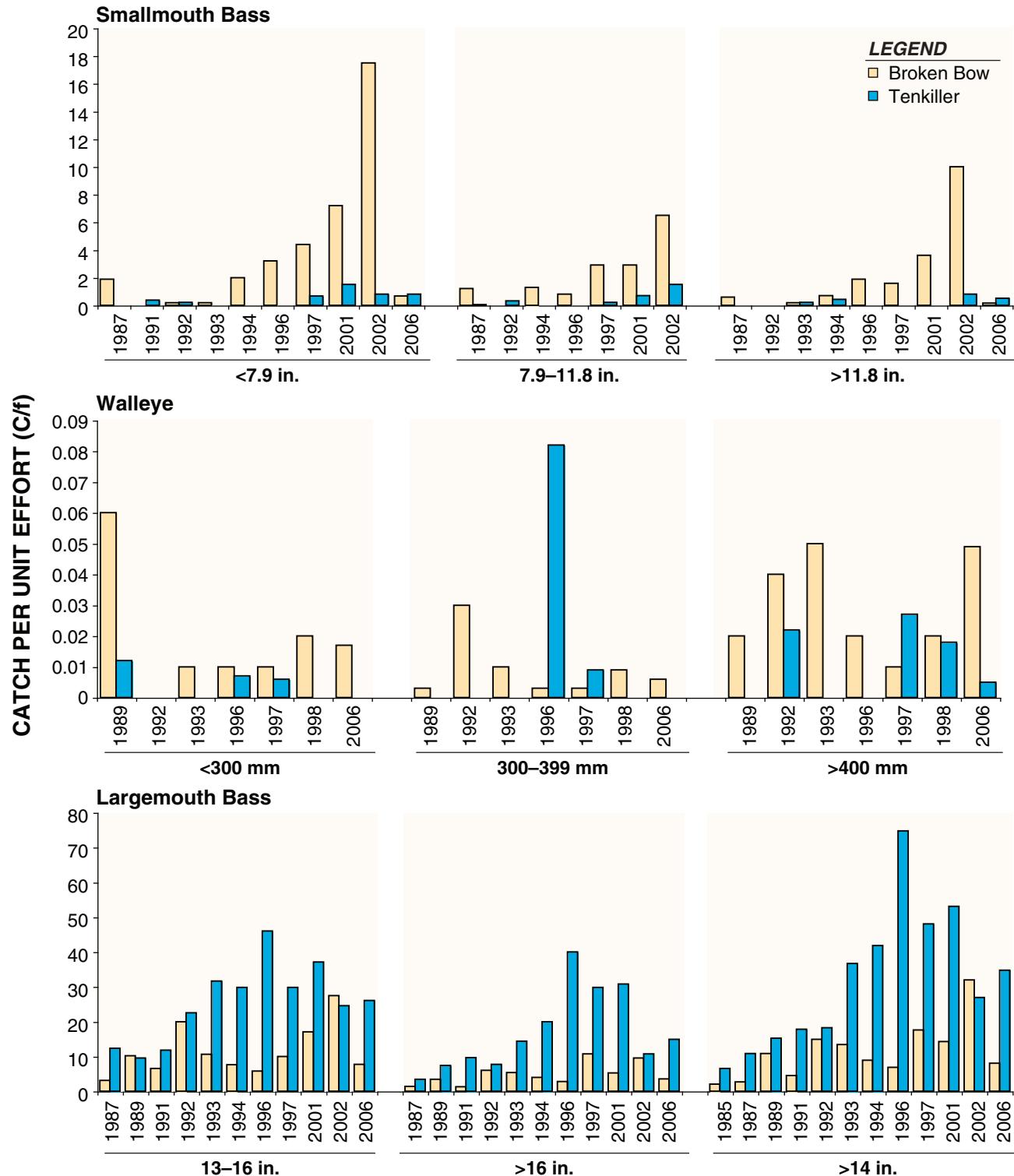
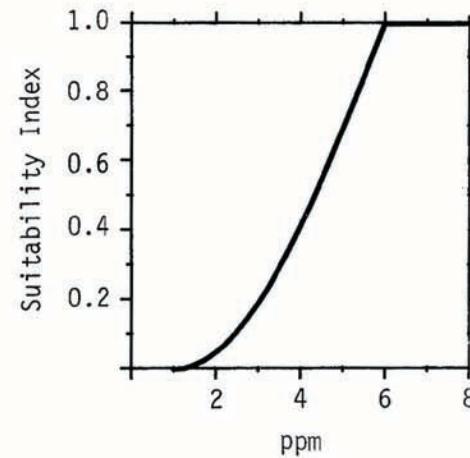


Figure 7-9. Comparison of catch rates between Broken Bow Reservoir and Tenkiller Ferry Lake

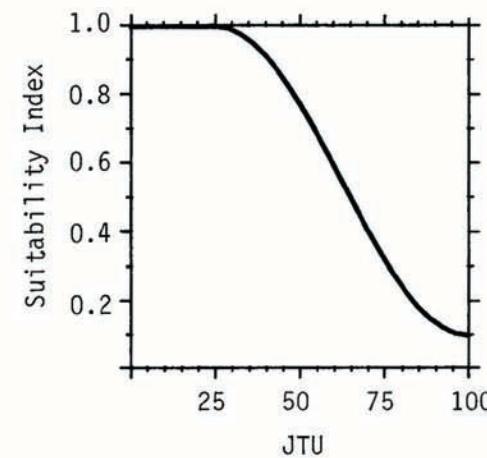
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R,L       $V_8$ 

Minimum dissolved oxygen level throughout the year.

R,L       $V_9$ 

Maximum monthly average turbidity level during the summer.

R,L       $V_{10}$ 

Water temperature in selected habitat during the growing season (May to October) (adults).

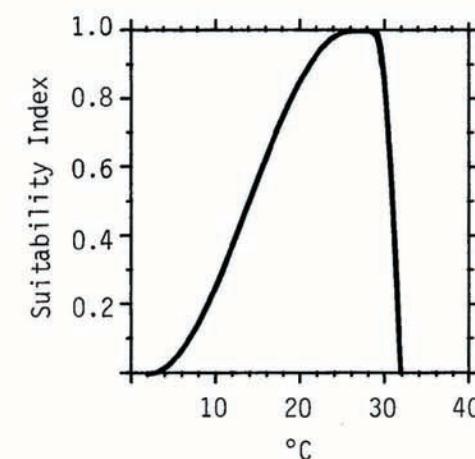
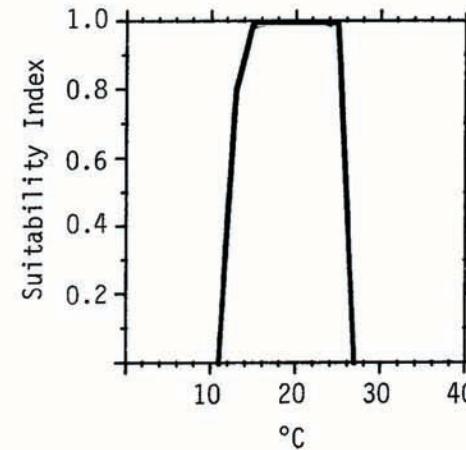


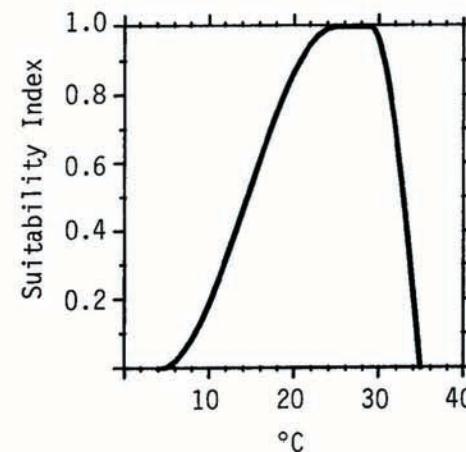
Figure 7-10. Habitat suitability curves for smallmouth bass—temperature curve for adults (from Edwards et al. 1983)

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R,L V<sub>11</sub> Water temperature in selected habitat during spawning and for 45 days afterwards (embryo).



R,L V<sub>12</sub> Water temperature in selected habitat during the growing season (May to October) (fry).



R,L V<sub>13</sub> Water temperature in selected habitat during the growing season (May to October) (juvenile).

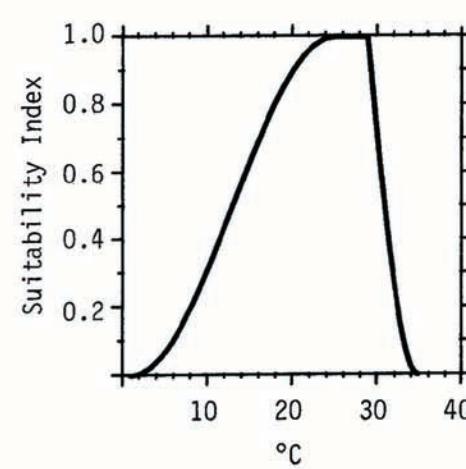


Figure 7-11. Habitat suitability curves for smallmouth bass—temperature curve for juveniles (from Edwards et al. 1983)



**Table 5-1. Site descriptions for 2005 benthic sampling stations**

| Station ID | Water Body       | Sub-basin<br>(mi <sup>2</sup> ) | Urban Land Use<br>(percent) | Reference Site? |
|------------|------------------|---------------------------------|-----------------------------|-----------------|
| BS-08      | Caney Creek      | 75.44                           | 5.98                        | No              |
| BS-117     | Illinois River   | 58.34                           | 5.24                        | No              |
| BS-208     | Peachester Creek | 21.77                           | 4.49                        | No              |
| BS-28      | Peavine Creek    | 13.20                           | 7.63                        | No              |
| BS-35      | Fly Creek        | 17.87                           | 3.27                        | No              |
| BS-62A     | Ballard Creek    | 40.84                           | 7.40                        | No              |
| BS-68      | Cincinnati Creek | 23.43                           | 3.89                        | No              |
| BS-HF04    | Sager Creek      | 19.13                           | 26.86                       | No              |
| BS-HF22    | Bush Creek       | 3.48                            | 6.75                        | No              |
| BS-HF28A   | Tyner Creek      | 18.14                           | 3.18                        | No              |
| BS-REF1    | Little Lee Creek | 51.17                           | 3.34                        | Yes             |
| BS-REF2    | Dry Creek        | 9.68                            | 3.83                        | Yes             |
| BS-REF3    | Spring Creek     | 32.38                           | 7.70                        | Yes             |

**Table 5-2. Site descriptions for 2006 benthic sampling stations**

| Station ID | Water Body                          | Sub-basin<br>(mi <sup>2</sup> ) | Urban Land<br>Use<br>(percent) | Reference Site? |
|------------|-------------------------------------|---------------------------------|--------------------------------|-----------------|
| RS-10003   | Little Lee Creek                    | 36.18                           | 3.41                           | Yes             |
| RS-10004   | Little Lee Creek                    | 75.42                           | 3.12                           | Yes             |
| RS-109     | Baron Fork                          | 15.51                           | 4.39                           | No              |
| RS-119     | Osage Creek                         | 35.61                           | 41.66                          | No              |
| RS-120     | Osage Creek                         | 33.35                           | 43.99                          | No              |
| RS-121     | Spring Creek                        | 35.23                           | 32.85                          | No              |
| RS-122     | Osage Creek                         | 38.83                           | 38.74                          | No              |
| RS-133     | Upper Illinois River                | 58.37                           | 5.24                           | No              |
| RS-137     | Upper Illinois River                | 13.56                           | 14.13                          | No              |
| RS-139     | Goose Creek                         | 8.03                            | 16.84                          | No              |
| RS-148     | Upper Illinois River                | 11.99                           | 7.22                           | No              |
| RS-150     | Lick Branch                         | 8.29                            | 8.18                           | No              |
| RS-180     | Flint Creek                         | 20.57                           | 5.33                           | No              |
| RS-19      | Clear Creek                         | 9.58                            | 27.33                          | No              |
| RS-205     | Baron Fork                          | 41.01                           | 3.82                           | No              |
| RS-225     | Fly Creek                           | 13.28                           | 3.46                           | No              |
| RS-233     | Muddy Fork                          | 63.17                           | 6.09                           | No              |
| RS-246     | Upper Illinois River                | 34.35                           | 6.72                           | No              |
| RS-25      | Mud Creek                           | 16.19                           | 58.97                          | No              |
| RS-28      | Clear Creek                         | 26.62                           | 46.64                          | No              |
| RS-286     | Osage Creek                         | 11.91                           | 40.18                          | No              |
| RS-29      | Clear Creek                         | 34.90                           | 44.80                          | No              |
| RS-297     | Osage Creek                         | 203.28                          | 20.15                          | No              |
| RS-31      | Upper Illinois River                | 33.85                           | 45.93                          | No              |
| RS-312     | Unnamed tributary to Illinois River | 7.73                            | 3.36                           | No              |
| RS-313     | Middle Illinois River               | 475.34                          | 15.56                          | No              |
| RS-329     | Sager Creek                         | 11.81                           | 32.30                          | No              |
| RS-336     | Sager Creek                         | 8.17                            | 14.82                          | No              |
| RS-340     | Spring Creek                        | 11.24                           | 55.69                          | No              |
| RS-344     | Cross Creek                         | 5.85                            | 7.65                           | No              |
| RS-345     | Spring Creek                        | 13.52                           | 56.28                          | No              |
| RS-347     | Spring Creek                        | 25.61                           | 42.24                          | No              |
| RS-349     | Spring Creek                        | 14.55                           | 53.41                          | No              |
| RS-350     | Osage Creek                         | 128.62                          | 25.80                          | No              |
| RS-395     | Middle Illinois River               | 43.88                           | 3.91                           | No              |
| RS-421     | Flint Creek                         | 115.05                          | 9.59                           | No              |
| RS-43      | Upper Illinois River                | 246.85                          | 12.80                          | No              |
| RS-443     | Terrapin Creek                      | 4.59                            | 4.53                           | No              |
| RS-50      | Muddy Creek                         | 71.23                           | 5.87                           | No              |
| RS-536     | Luna Branch                         | 4.64                            | 2.07                           | No              |
| RS-548     | Tyner Creek                         | 17.92                           | 3.18                           | No              |
| RS-56      | Hamestring Creek                    | 11.43                           | 29.92                          | No              |
| RS-57      | Upper Illinois River                | 10.10                           | 32.81                          | No              |
| RS-574     | Middle-Lower Illinois River         | 5.24                            | 15.84                          | No              |
| RS-577     | Middle-Lower Illinois River         | 5.74                            | 20.03                          | No              |
| RS-578     | Tahlequah Creek                     | 13.40                           | 34.57                          | No              |
| RS-625     | Middle-Lower Illinois River         | 3.95                            | 33.58                          | No              |
| RS-630     | Tahlequah Creek                     | 4.12                            | 36.33                          | No              |
| RS-654     | Illinois River                      | 945.69                          | 10.87                          | No              |
| RS-657     | Peavine Creek                       | 9.58                            | 7.46                           | No              |
| RS-662     | Peavine Creek                       | 5.91                            | 6.01                           | No              |
| RS-667     | Unnamed tributary to Baron Fork     | 5.78                            | 3.84                           | No              |
| RS-682     | Baron Fork                          | 68.76                           | 4.07                           | No              |
| RS-693     | Evansville Creek                    | 42.69                           | 3.96                           | No              |

**Table 5-2. (cont.)**

| Station ID | Water Body                              | Sub-basin<br>(mi <sup>2</sup> ) | Urban Land<br>Use<br>(percent) | Reference Site? |
|------------|---|---------------------------------|--------------------------------|-----------------|
| RS-7       | Upper Illinois River                    | 2.24                            | 62.24                          | No              |
| RS-704     | Caney Creek                             | 39.38                           | 8.05                           | No              |
| RS-706     | Unnamed tributary of Bidding Creek      | 14.08                           | 5.19                           | No              |
| RS-7194800 | Upper Illinois River                    | 166.56                          | 6.26                           | No              |
| RS-7195430 | Middle Illinois River                   | 564.81                          | 13.82                          | No              |
| RS-72      | Clear Creek                             | 50.23                           | 33.29                          | No              |
| RS-728     | Caney Creek                             | 5.74                            | 29.10                          | No              |
| RS-75      | Osage Creek                             | 78.52                           | 34.41                          | No              |
| RS-757     | Illinois River                          | 659.21                          | 12.85                          | No              |
| RS-77      | Upper Illinois River                    | 34.84                           | 13.40                          | No              |
| RS-770     | Tate Parris Branch                      | 6.14                            | 2.82                           | No              |
| RS-793     | Shell Branch                            | 4.24                            | 13.64                          | No              |
| RS-795     | Peachester Creek                        | 4.83                            | 4.73                           | No              |
| RS-86      | Upper Illinois River                    | 7.96                            | 26.48                          | No              |
| RS-901     | Flint Creek                             | 89.30                           | 11.18                          | No              |
| RS-902     | Flint Creek                             | 94.10                           | 10.84                          | No              |
| RS-97      | Unnamed tributary to Little Osage Creek | 8.49                            | 25.66                          | No              |

**Table 5-3. Site descriptions for 2007 benthic sampling stations**

| Station ID | Water Body                            | Sub-basin<br>(mi <sup>2</sup> ) | Urban Land<br>Use<br>(percent) | Reference Site? |
|------------|---------------------------------------|---------------------------------|--------------------------------|-----------------|
| RS-10003   | Little Lee Creek                      | 36.18                           | 3.41                           | Yes             |
| RS-10004   | Little Lee Creek                      | 75.42                           | 3.12                           | Yes             |
| BS-208     | Peacheater Creek                      | 21.77                           | 4.49                           | No              |
| BS-35      | Fly Creek                             | 17.87                           | 3.27                           | No              |
| BS-62A     | Ballard Creek                         | 40.84                           | 7.40                           | No              |
| BS-HF04    | Sager Creek                           | 19.13                           | 26.86                          | No              |
| BS-HF22    | Bush Creek                            | 3.48                            | 6.75                           | No              |
| RS-109     | Baron Fork                            | 15.51                           | 4.39                           | No              |
| RS-121     | Spring Creek                          | 35.23                           | 32.85                          | No              |
| RS-122     | Osage Creek                           | 38.83                           | 38.74                          | No              |
| RS-133     | Upper Illinois River                  | 58.37                           | 5.24                           | No              |
| RS-139     | Goose Creek                           | 8.03                            | 16.84                          | No              |
| RS-150     | Lick Branch                           | 8.29                            | 8.18                           | No              |
| RS-160     | Flint Creek                           | 14.33                           | 5.06                           | No              |
| RS-19      | Clear Creek                           | 9.58                            | 27.33                          | No              |
| RS-205     | Baron Fork                            | 41.01                           | 3.82                           | No              |
| RS-22      | Scull Creek                           | 4.21                            | 77.50                          | No              |
| RS-225     | Fly Creek                             | 13.28                           | 3.46                           | No              |
| RS-233     | Muddy Fork                            | 63.17                           | 6.09                           | No              |
| RS-234     | Upper Illinois River                  | 26.08                           | 4.19                           | No              |
| RS-25      | Mud Creek                             | 16.19                           | 58.97                          | No              |
| RS-28      | Clear Creek                           | 26.62                           | 46.64                          | No              |
| RS-29      | Clear Creek                           | 34.90                           | 44.80                          | No              |
| RS-297     | Osage Creek                           | 203.28                          | 20.15                          | No              |
| RS-312     | Unnamed tributary to Illinois River   | 7.73                            | 3.36                           | No              |
| RS-336     | Sager Creek                           | 8.17                            | 14.82                          | No              |
| RS-340     | Spring Creek                          | 11.24                           | 55.69                          | No              |
| RS-344     | Cross Creek                           | 5.85                            | 7.65                           | No              |
| RS-347     | Spring Creek                          | 25.61                           | 42.24                          | No              |
| RS-350     | Osage Creek                           | 128.62                          | 25.80                          | No              |
| RS-365     | Brush Creek                           | 12.01                           | 34.30                          | No              |
| RS-386     | Cincinnati Creek                      | 10.20                           | 4.19                           | No              |
| RS-392     | Cincinnati Creek                      | 5.59                            | 2.97                           | No              |
| RS-399     | Ballard Creek                         | 14.21                           | 8.36                           | No              |
| RS-402     | Sweetwater Creek                      | 6.04                            | 2.87                           | No              |
| RS-421     | Flint Creek                           | 115.05                          | 9.59                           | No              |
| RS-43      | Upper Illinois River                  | 246.85                          | 12.80                          | No              |
| RS-433     | Illinois River                        | 880.77                          | 11.37                          | No              |
| RS-443     | Terrapin Creek                        | 4.59                            | 4.53                           | No              |
| RS-518     | Park Hill Branch                      | 11.08                           | 10.95                          | No              |
| RS-53      | Hamestring Creek                      | 4.23                            | 44.02                          | No              |
| RS-536     | Luna Branch                           | 4.64                            | 2.07                           | No              |
| RS-541     | Unnamed tributary to Tyner Creek      | 7.16                            | 3.15                           | No              |
| RS-548     | Tyner Creek                           | 17.92                           | 3.10                           | No              |
| RS-56      | Hamestring Creek                      | 11.43                           | 29.92                          | No              |
| RS-578     | Tahlequah Creek                       | 13.40                           | 34.57                          | No              |
| RS-604     | Unnamed tributary to Illinois River   | 5.13                            | 2.15                           | No              |
| RS-630     | Tahlequah Creek                       | 4.12                            | 36.33                          | No              |
| RS-646     | Wall Trip Branch                      | 8.78                            | 3.82                           | No              |
| RS-649     | Baron Fork                            | 340.74                          | 4.49                           | No              |
| RS-654     | Illinois River                        | 945.69                          | 10.87                          | No              |
| RS-657     | Peavine Creek                         | 9.58                            | 7.46                           | No              |
| RS-667     | Unnamed tributary to Baron Fork       | 5.78                            | 3.84                           | No              |
| RS-68      | Cincinnati Creek                      | 23.43                           | 3.89                           | No              |
| RS-682     | Baron Fork                            | 68.76                           | 4.07                           | No              |
| RS-693     | Evansville Creek                      | 42.69                           | 3.96                           | No              |
| RS-696     | Unnamed tributary to Evansville Creek | 1.67                            | 5.00                           | No              |

**Table 5-3. (cont.)**

| Station ID | Water Body                              | Sub-basin<br>(mi <sup>2</sup> ) | Urban Land<br>Use<br>(percent) | Reference Site? |
|------------|---|---------------------------------|--------------------------------|-----------------|
| RS-706     | Unnamed tributary to Bidding Creek      | 14.08                           | 5.19                           | No              |
| RS-7195430 | Middle Illinois River                   | 564.81                          | 13.82                          | No              |
| RS-72      | Clear Creek                             | 50.23                           | 33.29                          | No              |
| RS-728     | Caney Creek                             | 5.74                            | 29.10                          | No              |
| RS-75      | Osage Creek                             | 78.52                           | 34.41                          | No              |
| RS-757     | Illinois River                          | 659.21                          | 12.85                          | No              |
| RS-770     | Tate Parris Branch                      | 6.14                            | 2.82                           | No              |
| RS-772     | Unnamed tributary to Illinois River     | 6.34                            | 11.27                          | No              |
| RS-793     | Shell Branch                            | 4.24                            | 13.64                          | No              |
| RS-795     | Peachester Creek                        | 4.83                            | 4.73                           | No              |
| RS-902     | Flint Creek                             | 94.10                           | 10.84                          | No              |
| RS-97      | Unnamed tributary to Little Osage Creek | 8.49                            | 25.66                          | No              |

**Table 5-4. Illinois River system benthic community metrics calculated from sampling events in 2005, 2006, and 2007**

|                        | 2005    |                    |         |         |        | 2006    |                    |         |         |        |
|------------------------|---------|--------------------|---------|---------|--------|---------|--------------------|---------|---------|--------|
|                        | Average | Standard Deviation | Maximum | Minimum | Median | Average | Standard Deviation | Maximum | Minimum | Median |
| Taxa richness          | 27.6    | 6.74               | 38      | 15      | 27.5   | 23.06   | 6.13               | 39      | 6       | 23     |
| EPT taxa richness      | 10.9    | 2.56               | 15      | 6       | 10.5   | 8.01    | 3.19               | 15      | 0       | 8      |
| Shannon Diversity      | 2.42    | 0.34               | 2.97    | 1.74    | 2.48   | 2.21    | 0.35               | 3.08    | 1.20    | 2.25   |
| Abundance              | 392.9   | 131.19             | 616     | 206     | 344    | 255.88  | 93.08              | 439     | 35      | 293    |
| EPT abundance (%)      | 46.57   | 14.15              | 72.51   | 18.67   | 47.97  | 50.36   | 22.97              | 87.82   | 0       | 51.46  |
| Dipteran abundance (%) | 8.04    | 9.02               | 24.95   | 0       | 2.63   | 10.05   | 12.28              | 73.31   | 0       | 5.69   |
| HBI                    | NA      | NA                 | NA      | NA      | NA     | 4.75    | 0.57               | 6.5     | 3.51    | 4.71   |
| NBI-P                  | NA      | NA                 | NA      | NA      | NA     | 5.14    | 0.85               | 7.41    | 3.41    | 5.05   |

**Table 5-4. (cont.)**

| 2007                   |         |                    |         |         |        |
|------------------------|---------|--------------------|---------|---------|--------|
|                        | Average | Standard Deviation | Maximum | Minimum | Median |
| Taxa richness          | 27.49   | 7.6                | 47      | 8       | 28     |
| EPT taxa richness      | 9.16    | 4.62               | 18      | 1       | 8.5    |
| Shannon Diversity      | 2.39    | 0.43               | 2.99    | 1.20    | 2.48   |
| Abundance              | 370.56  | 200.78             | 952     | 46      | 349.5  |
| EPT abundance (%)      | 32.64   | 23.15              | 90.36   | 0.85    | 32.62  |
| Dipteran abundance (%) | 48.07   | 27.93              | 93.20   | 0       | 44.83  |
| HBI                    | 5.3     | 1.02               | 7.82    | 3.19    | 5.23   |
| NBI-P                  | 6.48    | 1.08               | 9.5     | 4.03    | 6.52   |

**Note:** EPT - Ephemeroptera-Plecoptera-Trichoptera  
 HBI - Hilsenhoff Biotic Index  
 NA - not applicable  
 NBI-P - nutrient biotic index: phosphorus

**Table 5-5. Spearman correlations of 2006 and 2007 benthic metrics with sub-basin size**

| Endpoint                   | 2007        |         | 2006        |         |
|----------------------------|-------------|---------|-------------|---------|
|                            | Correlation | P-value | Correlation | P-value |
| HBI                        | -0.12       | 0.3375  | -0.19       | 0.1221  |
| NBI-P score                | -0.16       | 0.1874  | 0.16        | 0.1830  |
| Abundance                  | -0.09       | 0.4584  | 0.21        | 0.0898  |
| Taxa richness              | -0.03       | 0.8057  | 0.03        | 0.8206  |
| EPT taxa richness          | 0.03        | 0.7778  | 0.31        | 0.0100  |
| Shannon diversity score    | 0.02        | 0.8793  | 0.13        | 0.2894  |
| Percent EPT abundance      | 0.25        | 0.0424  | 0.15        | 0.2130  |
| Percent dipteran abundance | -0.14       | 0.2634  | -0.21       | 0.0905  |

**Note:** There are no correlations that are significant at a Bonferroni-adjusted significance level (0.05/8=0.0063).

P-values in the table have not been adjusted for the number of comparisons.

EPT - Ephemeroptera-Plecoptera-Trichoptera

HBI - Hilsenhoff Biotic Index

NBI-P - nutrient biotic index: phosphorus

**Table 5-6. Spearman correlations of 2006 and 2007 benthic metrics with percent urban land use**

| Endpoint                | 2007         |                   | 2006        |         |
|-------------------------|--------------|-------------------|-------------|---------|
|                         | Correlation  | P-value           | Correlation | P-value |
| HBI                     | <b>0.52</b>  | <b>&lt;0.0001</b> | 0.02        | 0.8383  |
| NBI-P                   | <b>0.51</b>  | <b>&lt;0.0001</b> | 0.25        | 0.0370  |
| Abundance               | <0.01        | 0.9943            | 0.07        | 0.6801  |
| Taxa richness           | -0.41        | <b>0.0009</b>     | -0.11       | 0.3579  |
| EPT taxa richness       | <b>-0.67</b> | <b>&lt;0.0001</b> | -0.14       | 0.2526  |
| Shannon diversity index | <b>-0.44</b> | <b>0.0003</b>     | 0.01        | 0.9226  |
| EPT abundance           | <b>-0.53</b> | <b>&lt;0.0001</b> | 0.14        | 0.2337  |
| Dipteran abundance      | <b>0.45</b>  | <b>0.0002</b>     | 0.13        | 0.2912  |

**Note:** Correlations that are significant at a Bonferroni-adjusted significance level (0.05/8=0.0063) are indicated in bold.

*P*-values in the table have not been adjusted for the number of comparisons.

EPT - Ephemeroptera-Plecoptera-Trichoptera

HBI - Hilsenhoff Biotic Index

NBI-P - nutrient biotic index: phosphorus

**Table 5-7. Fish metrics by sample location and sub-basin—2005**

| Station ID         | Water Body       | Sub-basin<br>(mi <sup>2</sup> ) | Total<br>Abundance | Taxa<br>Richness | Shannon<br>Diversity<br>Index | Number of<br>Sunfish<br>Species | Number of<br>Intolerant<br>Species | Percent of<br>Tolerant<br>Species | Total IBI<br>Score |
|--------------------|------------------|---------------------------------|--------------------|------------------|-------------------------------|---------------------------------|------------------------------------|-----------------------------------|--------------------|
| BS-08              | Caney Creek      | 75.44                           | 1,096              | 25               | 1.92                          | 5                               | 9                                  | 0.73                              | 41                 |
| BS-117             | Illinois River   | 58.34                           | 1,200              | 21               | 1.81                          | 6                               | 5                                  | 4.58                              | 37                 |
| BS-62A             | Ballard Creek    | 40.84                           | 620                | 16               | 1.52                          | 5                               | 7                                  | 0.16                              | 37                 |
| BS-68              | Cincinnati Creek | 23.43                           | 2,546              | 17               | 1.37                          | 4                               | 7                                  | 0.71                              | 37                 |
| BS-208             | Peachater Creek  | 21.77                           | 429                | 10               | 1.70                          | 0                               | 5                                  | 0.00                              | 32                 |
| BS-HF04            | Sager Creek      | 19.13                           | 1,067              | 20               | 1.41                          | 4                               | 9                                  | 1.31                              | 37                 |
| BS-HF28A           | Tyner Creek      | 18.14                           | 1,165              | 12               | 1.60                          | 1                               | 6                                  | 0.17                              | 35                 |
| BS-35              | Fly Creek        | 17.87                           | 2,114              | 19               | 1.19                          | 6                               | 5                                  | 1.47                              | 37                 |
| BS-28              | Peavine Creek    | 13.2                            | 568                | 14               | 1.79                          | 3                               | 7                                  | 0.18                              | 37                 |
| BS-HF22            | Bush Creek       | 3.48                            | 467                | 12               | 1.83                          | 1                               | 5                                  | 0.00                              | 35                 |
| BS-REF1            | Little Lee Creek | 51.17                           | 1,412              | 15               | 1.49                          | 4                               | 7                                  | 6.52                              | 35                 |
| BS-REF2            | Dry Creek        | 9.68                            | 1,012              | 5                | 0.87                          | 0                               | 3                                  | 0.00                              | 27                 |
| BS-REF3            | Spring Creek     | 32.38                           | 1,818              | 14               | 1.37                          | 2                               | 7                                  | 0.00                              | 33                 |
| Min within IRW     |                  | 429                             | 10                 | 1.19             | 0                             | 5                               | 0.00                               | 32                                |                    |
| Max within IRW     |                  | 2,546                           | 25                 | 1.92             | 6                             | 9                               | 4.58                               | 41                                |                    |
| Average within IRW |                  | 1,127                           | 17                 | 1.61             | 3.50                          | 6.50                            | 0.93                               | 36.5                              |                    |

**Table 5-8. Fish metrics by station and sub-basin for 2007 sampling event**

| Station ID | Water Body                             | Sub-basin<br>(mi <sup>2</sup> ) | Total<br>Abundance | Taxa<br>Richness | Shannon<br>Diversity<br>Index | Number of<br>Sunfish<br>Species | Number of<br>Intolerant<br>Taxa | Percent<br>Tolerant (of<br>Total Fish<br>Abundance) | Percent<br>Tolerant (of<br>Total Fish<br>Abundance) | Total IBI<br>Score |
|------------|--|---------------------------------|--------------------|------------------|-------------------------------|---------------------------------|---------------------------------|---|---|--------------------|
| RS-654     | Illinois River                         | 945.69                          | 843                | 29               | 2.58                          | 10                              | 8                               | 0.95  | 45  |                    |
| RS-433A    | Illinois River                         | 880.77                          | 629                | 25               | 1.51                          | 6                               | 8                               | 0.16  | 39  |                    |
| RS-757     | Illinois River                         | 659.21                          | 715                | 30               | 2.16                          | 11                              | 7                               | 3.08  | 43  |                    |
| RS-649     | Baron Fork                             | 304.74                          | 1,101              | 24               | 1.83                          | 8                               | 9                               | 0.09  | 41  |                    |
| RS-421     | Flint Creek                            | 115.05                          | 485                | 14               | 1.62                          | 2                               | 7                               | 1.24  | 35  |                    |
| RS-902     | Flint Creek                            | 94.10                           | 332                | 15               | 1.74                          | 6                               | 6                               | 0.00  | 39  |                    |
| RS-682     | Baron Fork                             | 68.76                           | 352                | 13               | 1.53                          | 4                               | 6                               | 0.57  | 39  |                    |
| RS-233     | Muddy Fork                             | 63.17                           | 313                | 20               | 2.48                          | 5                               | 6                               | 8.63  | 39  |                    |
| RS-693     | Evansville Creek                       | 42.69                           | 637                | 13               | 1.54                          | 3                               | 6                               | 6.43  | 37  |                    |
| BS-62A     | Ballard Creek                          | 40.84                           | 672                | 16               | 1.95                          | 4                               | 8                               | 1.04  | 39  |                    |
| RS-704     | Caney Creek                            | 39.98                           | 822                | 11               | 1.56                          | 1                               | 5                               | 0.00  | 33  |                    |
| RS-121     | Spring Creek                           | 35.23                           | 232                | 13               | 1.95                          | 4                               | 3                               | 6.03  | 37  |                    |
| RS-234     | Upper Illinois River                   | 26.08                           | 822                | 18               | 1.96                          | 4                               | 5                               | 9.25  | 35  |                    |
| BS-68      | Cincinnati Creek                       | 23.43                           | 565                | 14               | 1.69                          | 2                               | 5                               | 1.06  | 35  |                    |
| BS-208     | Peacheater Creek                       | 21.77                           | 238                | 15               | 2.22                          | 2                               | 7                               | 1.26  | 39  |                    |
| BS-HF04    | Sager Creek                            | 19.13                           | 333                | 12               | 1.52                          | 2                               | 5                               | 0.60  | 35  |                    |
| RS-548     | Tyner Creek                            | 17.92                           | 609                | 12               | 1.53                          | 2                               | 5                               | 0.16  | 35  |                    |
| BS-35      | Fly Creek                              | 17.87                           | 763                | 13               | 1.41                          | 3                               | 4                               | 2.88  | 27  |                    |
| RS-160     | Flint Creek                            | 14.33                           | 317                | 9                | 1.64                          | 0                               | 3                               | 0.00  | 33  |                    |
| RS-399     | Ballard Creek                          | 14.21                           | 408                | 10               | 1.03                          | 2                               | 3                               | 4.17  | 31  |                    |
| RS-706     | Unnamed tributary to<br>Bidding Creek  | 14.08                           | 287                | 19               | 2.10                          | 4                               | 7                               | 9.77  | 43  |                    |
| RS-578     | Tahlequah Creek                        | 13.40                           | 719                | 21               | 1.80                          | 4                               | 6                               | 0.00  | 39  |                    |
| RS-518     | Park Hill Branch                       | 11.08                           | 968                | 16               | 1.02                          | 4                               | 5                               | 2.07  | 31  |                    |
| RS-386     | Cincinnati Creek                       | 10.20                           | 443                | 11               | 1.80                          | 1                               | 4                               | 0.68  | 33  |                    |
| RS-657     | Peavine Creek                          | 9.58                            | 844                | 14               | 1.67                          | 2                               | 5                               | 0.00  | 33  |                    |
| RS-541     | Unnamed tributary to<br>Tyner Creek    | 7.16                            | 432                | 5                | 1.01                          | 0                               | 2                               | 0.00  | 25  |                    |
| RS-772     | Unnamed tributary to<br>Illinois River | 6.34                            | 350                | 8                | 1.34                          | 1                               | 4                               | 1.14  | 29  |                    |
| RS-770     | Tate Parris Branch                     | 6.14                            | 414                | 13               | 1.69                          | 3                               | 5                               | 0.24  | 37  |                    |

**Table 5-8. (cont.)**

| Station ID               | Water Body                             | Sub-basin<br>(mi <sup>2</sup> ) | Total<br>Abundance | Taxa<br>Richness | Shannon<br>Diversity<br>Index | Number of<br>Sunfish<br>Species | Number of<br>Intolerant<br>Taxa | Percent<br>Tolerant (of<br>Total Fish<br>Abundance) | Total IBI<br>Score |
|--------------------------|--|---------------------------------|--------------------|------------------|-------------------------------|---------------------------------|---------------------------------|---|--------------------|
| RS-667                   | Unnamed tributary to<br>Baron Fork     | 5.78                            | 128                | 8                | 1.73                          | 1                               | 3                               | 4.69  | 31                 |
| RS-728                   | Caney Creek                            | 5.74                            | 1,151              | 6                | 1.08                          | 1                               | 1                               | 0.26  | 25                 |
| RS-392                   | Cincinnati Creek                       | 5.59                            | 322                | 13               | 1.70                          | 3                               | 5                               | 2.48  | 35                 |
| RS-604                   | Unnamed tributary to<br>Illinois River | 5.13                            | 1,147              | 11               | 1.20                          | 1                               | 3                               | 0.17  | 29                 |
| RS-793                   | Shell Branch                           | 4.24                            | 114                | 8                | 1.91                          | 0                               | 4                               | 0.00  | 33                 |
| RS-630                   | Tahlequah Creek                        | 4.12                            | 452                | 5                | 1.11                          | 0                               | 1                               | 0.00  | 21                 |
| BS-HF22                  | Bush Creek                             | 3.48                            | 284                | 14               | 2.11                          | 4                               | 4                               | 2.11  | 41                 |
| RS-10003                 | Little Lee Creek                       | 36.18                           | 316                | 16               | 2.09                          | 3                               | 7                               | 2.53  | 37                 |
| RS-10004                 | Little Lee Creek                       | 75.42                           | 693                | 25               | 2.11                          | 5                               | 8                               | 1.30  | 41                 |
| Minimum Value within IRW |  |                                 | 114                | 5                | 1.01                          | 0                               | 1                               | 0   | 21                 |
| Maximum Value within IRW |  |                                 | 1,151              | 30               | 2.58                          | 11                              | 9                               | 10  | 45                 |
| Average Value within IRW |  |                                 | 549.80             | 14.23            | 1.68                          | 3.14                            | 5.00                            | 2.03  | 34.89              |

**Note:** IBI - index of biotic integrity  
 IRW - Illinois River Watershed

**Table 5-9. Summary of relationships of fish metrics to urban land use, sub-basin, and poultry house density**

| Endpoint <sup>b</sup>     | Urban Land |                        | Poultry<br>House<br>Density <sup>d</sup> | R <sup>2</sup> | Predicted Endpoint <sup>a</sup>              |  |  | Relative<br>Percent<br>Change <sup>e</sup> |
|---------------------------|------------|------------------------|--|----------------|--|--|--|--|
|                           | Use (%)    | Sub-basin <sup>c</sup> |  |                | Minimum<br>sub-basin<br>(3 mi <sup>2</sup> ) | Average<br>sub-basin<br>(103 mi <sup>2</sup> ) | Maximum<br>sub-basin<br>(946 mi <sup>2</sup> ) |  |
| Number of species         | ns         | <b>&lt;0.0001</b>      | ns                                       | 65%            | 10.9   | 16.3   | 29.8   | 64%  |
| Shannon Diversity Index   | ns         | 0.0202                 | ns                                       | 15%            | 1.6  | 1.7  | 2.2  | 27%  |
| Total number of fish      | ns         | ns                     | ns                                       | --             |  |  |  |  |
| Number of sunfish taxa    | ns         | <b>&lt;0.0001</b>      | ns                                       | 66%            | 1.7  | 4.1  | 9.9  | 83%  |
| Number of intolerant taxa | 0.0345     | <b>&lt;0.0001</b>      | ns                                       | 50%            | 4.1  | 5.6  | 9.0  | 54%  |
| Percent of tolerant fish  | ns         | ns                     | ns                                       | --             |  |  |  |  |
| IBI total score           | ns         | <b>0.0005</b>          | ns                                       | 31%            | 32.9   | 36.3   | 44.6   | 26%  |

**Note:** Linear regression models were fit using a stepwise approach, considering all interaction and main effect terms. The final model included only terms that were significant at the 0.05 level.

Values in the table are the P-values for the significant (<0.05) terms in the final model. All other interaction and main effects were not significant (P-value > 0.05).

P-values in table have not been adjusted for the number of comparisons. All relationships are still significant using a Bonferroni-adjusted significance level (0.05 / 7 = 0.0071).

R<sup>2</sup> - coefficient of determination of the final model

ns - not significant

<sup>a</sup> Predicted endpoints were calculated for the minimum, average, and maximum sub-basin sizes of the 2007 fish sampling locations.

<sup>b</sup> Endpoints based on the 2007 fish sampling.

<sup>c</sup> Sub-basin size was reported in square miles, therefore square-root of sub-basin size was used in the regression models.

<sup>d</sup> Calculated from information provided by individual Defendants.

<sup>e</sup> Calculated as the change in the predicted endpoint from the minimum to maximum sub-basin size, relative to the predicted value for the maximum sub-basin size.

**Table 5-10. Numbers of upstream poultry houses and upstream poultry house density for 2007 fish sampling stations<sup>a</sup>**

| Station ID | Number of Poultry Houses within Station<br>Sub-basin | Sub-basin<br>(mi <sup>2</sup> ) | Poultry House Density<br>(houses per mi <sup>2</sup> ) |
|------------|--|---------------------------------|--|
| BS-208     | 4  | 21.77                           | 0.18   |
| BS-35      | 60   | 17.87                           | 3.36   |
| BS-62A     | 107  | 40.84                           | 2.62   |
| BS-68      | 41   | 23.43                           | 1.75   |
| BS-HF04    | 16   | 19.13                           | 0.84   |
| BS-HF22    | 5  | 3.48                            | 1.44   |
| RS-121     | 67   | 35.23                           | 1.90   |
| RS-160     | 24   | 14.33                           | 1.67   |
| RS-233     | 214  | 63.17                           | 3.39   |
| RS-234     | 29   | 26.08                           | 1.11   |
| RS-386     | 46   | 10.2                            | 4.51   |
| RS-392     | 32   | 5.59                            | 5.72   |
| RS-399     | 44   | 14.21                           | 3.10   |
| RS-421     | 171  | 115.05                          | 1.49   |
| RS-433A    | 1,502  | 880.77                          | 1.71   |
| RS-518     | 0  | 11.08                           | 0.00   |
| RS-541     | 0  | 7.16                            | 0.00   |
| RS-548     | 4  | 17.92                           | 0.22   |
| RS-578     | 0  | 13.4                            | 0.00   |
| RS-604     | 0  | 5.13                            | 0.00   |
| RS-630     | 0  | 4.12                            | 0.00   |
| RS-649     | 243  | 340.74                          | 0.71   |
| RS-654     | 1,505  | 945.69                          | 1.59   |
| RS-657     | 2  | 9.58                            | 0.21   |
| RS-667     | 0  | 5.78                            | 0.00   |
| RS-682     | 149  | 68.76                           | 2.17   |
| RS-693     | 17   | 42.69                           | 0.40   |
| RS-704     | 12   | 39.38                           | 0.30   |
| RS-706     | 0  | 14.08                           | 0.00   |
| RS-728     | 8  | 5.74                            | 1.39   |
| RS-757     | 1,314  | 659.21                          | 1.99   |
| RS-770     | 4  | 6.14                            | 0.65   |
| RS-772     | 0  | 6.34                            | 0.00   |
| RS-793     | 4  | 4.24                            | 0.94   |
| RS-902     | 141  | 94.1                            | 1.50   |

<sup>a</sup> Calculated from information provided by individual Defendants.

**Table 5-11. Spearman correlations of fish metrics with poultry house density<sup>a</sup>**

| Endpoint <sup>b</sup>     | Correlation | P-value |
|---------------------------|-------------|---------|
| Number of species         | 0.21        | 0.2137  |
| Shannon Diversity Index   | 0.07        | 0.1170  |
| Total number of fish      | -0.12       | 0.4917  |
| Number of Sunfish taxa    | 0.34        | 0.0501  |
| Number of intolerant taxa | 0.16        | 0.3560  |
| Percent of tolerant fish  | 0.27        | 0.1131  |
| IBI total score           | 0.24        | 0.1547  |

**Note:** None of the correlations are significant at the 0.05 level.

*P*-values in the table have not been adjusted for the number of comparisons.

<sup>a</sup> Calculated from information provided by individual Defendants.

<sup>b</sup> Endpoints based on the 2007 fish sampling.

**Table 5-12. Spearman correlations of fish metrics with percent urban land use**

| Endpoint <sup>a</sup>     | Correlation | P-value |
|---------------------------|-------------|---------|
| Number of species         | 0.11        | 0.5179  |
| Shannon Diversity Index   | 0.03        | 0.8651  |
| Total number of fish      | 0.01        | 0.9404  |
| Number of Sunfish taxa    | 0.12        | 0.4671  |
| Number of intolerant taxa | 0.04        | 0.8163  |
| Percent of tolerant fish  | -0.17       | 0.3339  |
| IBI total score           | 0.08        | 0.6410  |

**Note:** None of the correlations are significant at the 0.05 level.

*P*-values in the table have not been adjusted for the number of comparisons.

<sup>a</sup> Endpoints based on the 2007 fish sampling.

**Table 5-13. Spearman correlations of fish metrics with sub-basin size**

| Endpoint <sup>a</sup>     | Correlation | P-value           |
|---------------------------|-------------|-------------------|
| Number of species         | <b>0.64</b> | <b>0.0002</b>     |
| Shannon Diversity Index   | 0.31        | 0.0752            |
| Total number of fish      | 0.20        | 0.2353            |
| Number of Sunfish taxa    | <b>0.64</b> | <b>0.0002</b>     |
| Number of intolerant taxa | <b>0.74</b> | <b>&lt;0.0001</b> |
| Percent of tolerant fish  | 0.14        | 0.4081            |
| IBI total score           | <b>0.60</b> | <b>0.0004</b>     |

**Note:** P-values in the table have not been adjusted for the number of comparisons. Correlations significant at a Bonferroni-adjusted significance ( $0.05/7 = 0.0071$ ) are indicated in bold.

<sup>a</sup> Endpoints based on the 2007 fish sampling.

**Table 5-14. Summary of fish IBI scores for sample stations located downstream of Cargill contract growers and breeder operations**

| Closest Downstream Fish Station/Cargill Grower Farm   | 2007 Fish IBI Score | Poultry House Density <sup>a</sup> |
|---|---------------------|------------------------------------|
| <b>BS-35</b><br>Haegele Farm  | 27                  | 3.36                               |
| <b>BS-62A</b><br>Ramsey Farm<br>Joua Farm   | 39                  | 2.62                               |
| <b>RS-121</b><br>Circle G Farms - Gibbs, Dorlen   | 37                  | 1.90                               |
| <b>RS-160</b><br>Brigance Farm  | 33                  | 1.68                               |
| <b>RS-234</b><br>Findahl Farm<br>Aday Farm<br>Findahl Farm<br>T & G Farm - Horne, Travis & Gwen<br>Thomas Farm - Thomas, Ken & Donna  | 35                  | 1.11                               |
| <b>RS-399</b><br>Edwards Farm<br>Bickford Farm  | 31                  | 3.10                               |
| <b>RS-421</b><br>Hurt Farm<br>Mitchell Farm   | 35                  | 1.49                               |
| <b>RS-433A</b><br>Hill Haven Farm - Schwabe, Robert   | 39                  | 1.71                               |
| <b>RS-649</b><br>Biggs Farm<br>Doyle Farm<br>Masters Farm   | 41                  | 0.71                               |
| <b>RS-654</b><br>Gary Fisher  | 45                  | 1.59                               |
| <b>RS-757</b><br>Lester Farm<br>Breeder Farm #5<br>Breeder Farm #6<br>Breeder Farm #4<br>Roberts, Nolan & Joan - Roberts Farm<br>Crockett Farm<br>Breeder Farm #1 & Breeder Farm #2<br>Breeder Farm #3<br>Rutherford Farm<br>Hancock Holdings - Kings Ranch<br>Reed, Dondal Lee & Doris Ann<br>Reed, Joe - Reed Valley Farms<br>Swearingen Farm<br>Roberts, Nolan & Joan - Fairmount Farm<br>Turkey Ridge Farm - Bush, Darrel | 43                  | 1.99                               |
| <b>RS-902</b><br>Bishop Farm  | 39                  | 1.50                               |
| Average   | 37.0                | 1.90                               |

**Note:** IBI - index of biotic integrity

<sup>a</sup> Calculated from information provided by individual Defendants

**Table 5-15. OWRB BUMP reports summaries 2001–2007 beneficial use rating for Fish and Wildlife Propagation by report year for stations in the Illinois River system**

| Report Year | Location Type | Name                             | County | W.Q. Segment Number | Last Year Sampled | FWP    |
|-------------|---------------|----------------------------------|--------|---------------------|-------------------|--------|
| 2007        | Stream        | Baron Fork, SH 51, Eldon         | --     | --                  | --                | S      |
| 2005        | Stream        | Baron Fork, SH 51, Eldon         | --     | --                  | --                | S      |
| 2004        | Stream        | Baron Fork, SH 51, Eldon         | --     | --                  | --                | S      |
| 2003        | Stream        | Baron Fork, SH 51, Eldon         | --     | --                  | --                | S      |
| 2002        | Stream        | Baron Fork, SH 51, Eldon         | --     | --                  | --                | S      |
| 2001        | Stream        | Baron Fork, SH 51, Eldon         | --     | --                  | --                | S      |
| 2007        | Stream        | Caney Creek, off SH 100, Barber  | --     | --                  | --                | S      |
| 2005        | Stream        | Caney Creek, off SH 100, Barber  | --     | --                  | --                | S      |
| 2004        | Stream        | Caney Creek, off SH 100, Barber  | --     | --                  | --                | S      |
| 2003        | Stream        | Caney Creek, off SH 100, Barber  | --     | --                  | --                | S      |
| 2002        | Stream        | Caney Creek, off SH 100, Barber  | --     | --                  | --                | S      |
| 2001        | Stream        | Caney Creek, off SH 100, Barber  | --     | --                  | --                | PS (5) |
| 2007        | Stream        | Flint Creek, US 412, Flint       | --     | --                  | --                | S      |
| 2005        | Stream        | Flint Creek, US 412, Flint       | --     | --                  | --                | S      |
| 2004        | Stream        | Flint Creek, US 412, Flint       | --     | --                  | --                | S      |
| 2003        | Stream        | Flint Creek, US 412, Flint       | --     | --                  | --                | S      |
| 2002        | Stream        | Flint Creek, US 412, Flint       | --     | --                  | --                | S      |
| 2001        | Stream        | Flint Creek, US 412, Flint       | --     | --                  | --                | S      |
| 2007        | Stream        | Illinois River, US 59, Watts     | --     | --                  | --                | NS (5) |
| 2005        | Stream        | Illinois River, US 59, Watts     | --     | --                  | --                | PS (5) |
| 2004        | Stream        | Illinois River, US 59, Watts     | --     | --                  | --                | NS (5) |
| 2003        | Stream        | Illinois River, US 59, Watts     | --     | --                  | --                | NS (5) |
| 2002        | Stream        | Illinois River, US 59, Watts     | --     | --                  | --                | NS (5) |
| 2001        | Stream        | Illinois River, US 59, Watts     | --     | --                  | --                | NS (5) |
| 2007        | Stream        | Illinois River, US 62, Tahlequah | --     | --                  | --                | S      |
| 2005        | Stream        | Illinois River, US 62, Tahlequah | --     | --                  | --                | S      |
| 2004        | Stream        | Illinois River, US 62, Tahlequah | --     | --                  | --                | S      |
| 2003        | Stream        | Illinois River, US 62, Tahlequah | --     | --                  | --                | S      |
| 2002        | Stream        | Illinois River, US 62, Tahlequah | --     | --                  | --                | S      |
| 2001        | Stream        | Illinois River, US 62, Tahlequah | --     | --                  | --                | S      |

**Table 5-15. (cont.)**

| Report Year | Location<br>Type | Name   | County | W.Q.<br>Segment<br>Number | Last Year<br>Sampled | FWP |
|-------------|------------------|--|--------|---------------------------|----------------------|-----|
| 2007        | Stream           | Sager Creek, off US 412, West Siloam Springs | --     | --                        | --                   | S   |
| 2005        | Stream           | Sager Creek, off US 412, West Siloam Springs | --     | --                        | --                   | S   |
| 2004        | Stream           | Sager Creek, off US 412, West Siloam Springs | --     | --                        | --                   | S   |
| 2003        | Stream           | Sager Creek, off US 412, West Siloam Springs | --     | --                        | --                   | S   |
| 2002        | Stream           | Sager Creek, off US 412, West Siloam Springs | --     | --                        | --                   | S   |
| 2001        | Stream           | Sager Creek, off US 412, West Siloam Springs | --     | --                        | --                   | S   |

**Note:**

- -
- BUMP - Beneficial Use Monitoring Program
- FWP - fish and wildlife propagation
- NS - not supporting
- OWRB - Oklahoma Water Resources Board
- PS - partially supporting
- S - fully supporting

## Water Quality Variables (in parentheses)

- 1 - Dissolved Oxygen
- 2 - Metals (Acute)
- 3 - Metals (Chronic)
- 4 - pH
- 5 - Turbidity

**Table 5-16. Oklahoma Beneficial Use Report (2007) summary of IBI scores for stream stations within the IRW**

| BUMP Station                         | Station Name                     | Dates of Assessment                                 | Station Location                             | Station Sample Composition Score | Fish Condition Score | Total IBI Score |
|--------------------------------------|----------------------------------|---|--|----------------------------------|----------------------|-----------------|
| Baron Fork near Eldon                | AT197000<br>(121700050010-001AT) | May 2002–April 2007, summer<br>2005 fish collection | Baron Fork, SH51, Eldon                      | 24/30                            | 15/15                | 39/45           |
| Caney Creek near Barber              | AT197360<br>(121700040010-001AT) | May 2002–April 2007, summer<br>2003 fish collection | Caney Creek, off SH 100, Barber              | 24/30                            | 15/15                | 39/45           |
| Flint Creek near Flint, OK           | AT196000<br>(121700060010-001AT) | May 2002–April 2007, summer<br>2003 fish collection | Flint Creek, US 412, Flint                   | 24/30                            | 15/15                | 39/45           |
| Illinois River near Tahlequah        | AT196500<br>(121700030010-001AT) | May 2002–April 2007                                 | Illinois River, US 62, Tahlequah             | NA                               | NA                   | NA              |
| Illinois River near Watts            | AT195500<br>(121700030350-001AT) | October 2001–September 2006                         | Illinois River, US 59, Watts                 | NA                               | NA                   | NA              |
| Sager Creek near West Siloam Springs | AT195865<br>(121700060080-001AT) | May 2002–April 2007, summer<br>2003 fish collection | Sager Creek, off US 412, West Siloam Springs | 26/30                            | 15/15                | 41/45           |

**Table 7-1. Summary of bass tournaments in Oklahoma**

| Lake           | Average per Tournament |      |                         |      |
|----------------|------------------------|------|-------------------------|------|
|                | Bass per Angler        |      | Weight per Fish<br>(lb) |      |
|                | 2006                   | 2007 | 2006                    | 2007 |
| Am. Horse      | 2.5                    | 1.6  | 1.12                    | 0.95 |
| Arbuckle       | 1.7                    | 2.2  | 1.70                    | 1.96 |
| Ardmore        | 3.3                    | 1.1  | 1.69                    | 1.67 |
| Atlas Lugert   | 0.6                    |      | 2.13                    |      |
| Birch          | 2.0                    | 1.2  | 0.93                    | 1.21 |
| Broken Bow     | 2.6                    | 2.5  | 1.76                    | 1.74 |
| Canton         | 4.0                    | 1.2  | 2.86                    | 2.79 |
| Carl Blackwell | 0.9                    | 0.8  | 1.90                    | 1.94 |
| Chouteau       | 2.7                    | 1.0  | 2.25                    | 2.02 |
| Claremore      |                        | 1.7  |                         | 2.75 |
| Clear Creek    | 0.4                    | 0.2  | 2.65                    | 2.60 |
| Comanche       | 0.9                    |      | 3.23                    |      |
| Copan          | 0.4                    | 0.6  | 2.38                    | 2.67 |
| Crowder        | 0.7                    | 1.0  | 1.21                    | 0.98 |
| Cushing        | 1.7                    | 0.4  | 2.68                    | 2.38 |
| Duncan         | 1.7                    | 0.8  | 1.28                    | 1.79 |
| Ellsworth      | 1.7                    | 1.3  | 2.36                    | 1.89 |
| Elmer Thomas   | 1.8                    | 0.6  | 2.20                    | 1.69 |
| Eucha          |                        | 2.9  |                         | 2.02 |
| Eufaula        | 0.9                    | 2.2  | 2.24                    | 2.29 |
| Fairfax        | 0.7                    |      | 1.68                    |      |
| Foss           | 1.9                    | 1.7  | 2.60                    | 2.35 |
| Ft. Cobb       | 0.9                    | 0.9  | 2.77                    | 2.65 |
| Ft. Gibson     | 1.2                    | 2.2  | 2.17                    | 2.48 |
| Fuqua          | 2.4                    | 2.6  | 2.29                    | 2.58 |
| Grand          | 1.2                    | 2.2  | 2.18                    | 2.41 |
| Greenleaf      | 1.0                    |      | 2.38                    |      |
| Guthrie        | 0.6                    | 0.3  | 2.11                    | 2.23 |
| Hominy         | 1.8                    |      | 2.12                    |      |
| Hudson         | 1.8                    | 2.8  | 2.30                    | 2.70 |
| Hugo           | 0.4                    | 1.5  | 2.01                    | 2.48 |
| Hulah          | 0.8                    |      | 2.41                    |      |
| Humphreys      | 1.0                    | 0.2  | 2.18                    | 1.99 |
| Kaw            | 3.1                    | 3.0  | 2.36                    | 2.25 |
| Kerr           | 1.5                    |      | 2.46                    |      |
| Keystone       | 2.4                    | 2.2  | 2.31                    | 2.57 |
| Konawa         | 2.8                    | 2.3  | 1.61                    | 1.50 |
| Lawtonka       | 0.6                    | 2.0  | 2.19                    | 2.42 |
| Lone Chimney   | 0.7                    |      | 1.84                    |      |
| Longmire       | 3.3                    |      | 2.16                    |      |
| McGee Creek    | 0.5                    | 3.1  | 1.20                    | 1.28 |
| McMurtry       | 2.1                    | 1.0  | 2.15                    | 2.35 |
| Murray         | 1.3                    | 3.1  | 1.46                    | 1.38 |
| Okemah         | 1.4                    | 2.7  | 2.88                    | 1.84 |
| Oologah        | 0.3                    | 2.3  | 2.63                    | 2.82 |
| Pauls Valley   | 2.5                    |      | 2.48                    |      |

**Table 7-1. (cont.)**

| Lake                            | Average per Tournament |          |                         |           |
|---------------------------------|------------------------|----------|-------------------------|-----------|
|                                 | Bass per Angler        |          | Weight per Fish<br>(lb) |           |
|                                 | 2006                   | 2007     | 2006                    | 2007      |
| Ponca City                      | 1.2                    | 1.0      | 2.63                    | 2.15      |
| Prague                          | 1.5                    |          | 2.34                    |           |
| Sardis                          | 2.4                    | 1.4      | 2.31                    | 2.18      |
| Scott King                      |                        | 0.9      |                         | 1.99      |
| Shell Creek                     |                        | 2.2      |                         | 2.19      |
| Skiatook                        | 1.8                    | 2.4      | 1.64                    | 1.59      |
| Sooner                          | 1.8                    | 3.1      | 2.20                    | 2.32      |
| Sportsman                       | 1.0                    |          | 1.16                    |           |
| Tenkkiller Ferry Lake           | 2.2                    | 2.5      | 2.25                    | 2.27      |
| Texoma                          | 1.9                    | 2.8      | 2.07                    | 2.12      |
| Thunderbird                     | 3.4                    | 1.9      | 2.89                    | 3.01      |
| Vanderwork                      | 1.9                    |          | 1.20                    |           |
| Waurika                         | 0.5                    | 0.5      | 3.45                    | 2.38      |
| Web. Falls                      | 1.3                    | 0.8      | 2.17                    | 2.25      |
| Wes Watkins                     | 0.8                    | 2.9      | 3.03                    | 3.14      |
| Wetumka                         | 0.6                    |          | 1.25                    |           |
| Wister                          | 1.7                    |          | 2.55                    |           |
| Summary statistics              |                        |          |                         |           |
| Number of lakes                 | 61                     | 50       | 61                      | 50        |
| Minimum                         | 0.3                    | 0.2      | 0.93                    | 0.95      |
| Median                          | 1.5                    | 1.8      | 2.20                    | 2.25      |
| Maximum                         | 2006.0                 | 2007.0   | 2006.00                 | 2007.00   |
| Value (percentile)              |                        |          |                         |           |
| Broken Bow Reservoir            | 2.6 (87)               | 2.5 (74) | 1.76 (25)               | 1.74 (20) |
| Tenkkiller Ferry Lake Reservoir | 2.2 (77)               | 2.5 (74) | 2.25 (54)               | 2.27 (54) |

**Note:** Data from Oklahoma Department of Wildlife Conservation bass fishing tournament summary reports, available at [www.wildlifedepartment.com/bassreports.htm](http://www.wildlifedepartment.com/bassreports.htm).

Percentile is the percent of lakes at or below

**Table 7-2. Overall best fishing rankings by ODWC for Broken Bow Reservoir and Tenkiller Ferry Lake**

| Year | Broken Bow Reservoir         |                                    |                                 | Tenkiller Ferry Lake         |                                    |                                 | All Lakes                          |                          | Estimated Total<br>Number of<br>Tournaments <sup>b</sup> |
|------|------------------------------|------------------------------------|---------------------------------|------------------------------|------------------------------------|---------------------------------|------------------------------------|--------------------------|--|
|      | Overall<br>Rank <sup>a</sup> | Tournament<br>Reports<br>Submitted | Tournament<br>Permits<br>Issued | Overall<br>Rank <sup>a</sup> | Tournament<br>Reports<br>Submitted | Tournament<br>Permits<br>Issued | Tournament<br>Reports<br>Submitted | Permitted<br>Tournaments |  |
| 2001 | NR                           | 8                                  | --                              | 19                           | 126                                | --                              | 703                                | 1,297                    | 1,425  |
| 2002 | NR                           | 5                                  | --                              | 19                           | 87                                 | --                              | 685                                | 1,252                    | 1,375  |
| 2003 | 2                            | 19                                 | --                              | 8                            | 88                                 | --                              | 727                                | 1,200                    | 1,320  |
| 2004 | 5                            | 11                                 | 32                              | 10                           | 102                                | 125                             | 637                                | 1,110                    | 1,220  |
| 2005 | 4                            | 20                                 | 37                              | 8                            | 66                                 | 90                              | 723                                | 1,077                    | 1,185  |
| 2006 | NR                           | 6                                  | 34                              | 15                           | 73                                 | 99                              | 588                                | 1,251                    | 1,376  |
| 2007 | NR                           | 3                                  | --                              | 11                           | 66                                 | --                              | 457                                | --                       | --   |

**Note:** All data from ODWC fishing tournament summary reports, available at [www.wildlifedepartment.com/bassreports.htm](http://www.wildlifedepartment.com/bassreports.htm)

-- - not reported

ODWC - Oklahoma Department of Wildlife Conservation

NR - not ranked

<sup>a</sup> Lakes must have 10 or more tournament reports submitted to be ranked by ODWC.

<sup>b</sup> Includes permitted tournaments plus the estimated number of unpermitted tournaments.

**Table 7-3. Comparison of smallmouth bass catch rates between Broken Bow Reservoir and Tenkiller Ferry Lake**

| Year   | <7.9 in.                       |                                     | 7.9–11.8 in.                        |   | ≥11.8 in.                        |                                     |
|--|--------------------------------|-------------------------------------|-------------------------------------|---|----------------------------------|-------------------------------------|
|  | Broken Bow<br><200 mm<br>(≥40) | Tenkille<br>r Ferry Lake<br><200 mm | Broken Bow<br>200–299<br>mm (15–45) | Tenkille<br>r Ferry Lake<br>200–299<br>mm | Broken Bow<br>≥300 mm<br>(15–30) | Tenkille<br>r Ferry Lake<br>>300 mm |
|  |                                |                                     |                                     |   |                                  |                                     |
| 1977   |                                | 3.81                                |                                     | 0.21                                      |                                  | 0                                   |
| 1978   |                                | 0.38                                |                                     | 0.76                                      |                                  | 0.38                                |
| 1980   |                                | 0.17                                |                                     | 0.24                                      |                                  | 0.07                                |
| 1981   | 2.4                            |                                     |                                     |   |                                  |                                     |
| 1982   |                                | 0.08                                |                                     | 0.11                                      |                                  | 0.05                                |
| 1984   |                                | 0                                   |                                     | 0.03                                      |                                  | 0                                   |
| 1985   |                                | 0                                   |                                     | 0.04                                      |                                  | 0                                   |
| 1986   |                                | 0                                   |                                     | 0.04                                      |                                  | 0                                   |
| 1987   | 1.9                            | 0                                   | 1.2                                 | 0.05                                      | 0.6                              | 0                                   |
| 1988   |                                | 0.06                                |                                     | 0   |                                  | 0                                   |
| 1989   | 3.8                            |                                     | 1.4                                 |   | 2.4                              |                                     |
| 1990   |                                | 0                                   |                                     | 0.16                                      |                                  | 0                                   |
| 1991   | 0                              | 0.37                                |                                     | 0   |                                  | 0                                   |
| 1992   | 0.2                            | 0.21                                | 0                                   | 0.32                                      | 0                                | 0                                   |
| 1993   | 0.2                            | 0                                   |                                     | 0   | 0.2                              | 0.22                                |
| 1994   | 2                              | 0                                   | 1.3                                 | 0   | 0.7                              | 0.44                                |
| 1995   | 0.2                            |                                     | 0.2                                 |   | 0                                |                                     |
| 1996   | 3.2                            | 0                                   | 0.8                                 | 0   | 1.9                              | 0                                   |
| 1997   | 4.4                            | 0.67                                | 2.9                                 | 0.22                                      | 1.6                              | 0                                   |
| 1998   | 14.3                           |                                     | 9.3                                 |   | 5                                |                                     |
| 1999   |                                | 4                                   |                                     | 0.3                                       |                                  | 1.3                                 |
| 2000   | 3.7                            |                                     | 2.3                                 |   | 1                                |                                     |
| 2001   | 7.2                            | 1.5                                 | 2.9                                 | 0.7                                       | 3.6                              | 0                                   |
| 2002   | 17.5                           | 0.8                                 | 6.5                                 | 1.5                                       | 10                               | 0.8                                 |
| 2003   |                                | 0.9                                 |                                     | 0.4                                       |                                  | 0.1                                 |
| 2004   | 8.5                            |                                     | 4.7                                 |   | 3.5                              |                                     |
| 2005   |                                | 1.3                                 |                                     | 2.3                                       |                                  | 1.2                                 |
| 2006   | 0.67                           | 0.8                                 |                                     | 2.9                                       | 0.17                             | 0.5                                 |
| <b>Subset of years when both lakes were measured</b>       |                                |                                     |                                     |   |                                  |                                     |
| 1987   | 1.9                            | 0                                   | 1.2                                 | 0.05                                      | 0.6                              | 0                                   |
| 1991   | 0                              | 0.37                                |                                     |   |                                  |                                     |
| 1992   | 0.2                            | 0.21                                | 0                                   | 0.32                                      | 0                                | 0                                   |
| 1993   | 0.2                            | 0                                   |                                     |   | 0.2                              | 0.22                                |
| 1994   | 2                              | 0                                   | 1.3                                 | 0   | 0.7                              | 0.44                                |
| 1996   | 3.2                            | 0                                   | 0.8                                 | 0   | 1.9                              | 0                                   |
| 1997   | 4.4                            | 0.67                                | 2.9                                 | 0.22                                      | 1.6                              | 0                                   |
| 2001   | 7.2                            | 1.5                                 | 2.9                                 | 0.7                                       | 3.6                              | 0                                   |
| 2002   | 17.5                           | 0.8                                 | 6.5                                 | 1.5                                       | 10                               | 0.8                                 |
| 2006   | 0.67                           | 0.8                                 |                                     |   | 0.17                             | 0.5                                 |
| <b>Differences (Broken Bow minus Tenkiller Ferry Lake)</b> |                                |                                     |                                     |   |                                  |                                     |
| 1987   |                                | 1.9                                 |                                     | 1.15                                      |                                  | 0.6                                 |
| 1991   |                                | -0.37                               |                                     |   |                                  |                                     |
| 1992   |                                | -0.01                               |                                     | -0.32                                     |                                  | 0                                   |
| 1993   |                                | 0.2                                 |                                     |   |                                  | -0.02                               |
| 1994   |                                | 2                                   |                                     | 1.3                                       |                                  | 0.26                                |
| 1996   |                                | 3.2                                 |                                     | 0.8                                       |                                  | 1.9                                 |
| 1997   |                                | 3.73                                |                                     | 2.68                                      |                                  | 1.6                                 |
| 2001   |                                | 5.7                                 |                                     | 2.2                                       |                                  | 3.6                                 |
| 2002   |                                | 16.7                                |                                     | 5   |                                  | 9.2                                 |
| 2006   |                                | -0.13                               |                                     |   |                                  | -0.33                               |
| N  |                                | 10                                  |                                     | 7   |                                  | 9                                   |
| Mean   |                                | 3.292                               |                                     | 1.830                                     |                                  | 1.868                               |
| StDev  |                                | 5.110                               |                                     | 1.700                                     |                                  | 3.019                               |
| t-stat   |                                | 2.0374                              |                                     | 2.8485                                    |                                  | 1.8561                              |
| P-value  |                                | 0.0721                              |                                     | 0.0292                                    |                                  | 0.1005                              |

**Table 7-4. Comparison of walleye catch rates between Broken Bow Reservoir and Tenkiller Ferry Lake**

| Year   | Tenkiller                        |                       | Tenkiller                           |                          | Tenkiller                        |                       |
|--|----------------------------------|-----------------------|-------------------------------------|--------------------------|----------------------------------|-----------------------|
|  | Broken Bow<br><300 mm<br>(≥0.06) | Ferry Lake<br>≤300 mm | Broken Bow<br>300–399 mm<br>(≥0.02) | Ferry Lake<br>301–399 mm | Broken Bow<br>≥400 mm<br>(≥0.02) | Ferry Lake<br>≥400 mm |
| 1985   | 0.02                             |                       | 0                                   |                          | 0.01                             |                       |
| 1987   | 0.01                             |                       | 0.02                                |                          | 0.01                             |                       |
| 1989   | 0.06                             | 0.012                 | 0.003                               | 0                        | 0.02                             | 0                     |
| 1990   |                                  | 0.008                 |                                     | 0.004                    |                                  | 0                     |
| 1991   | 0.02                             |                       | 0.02                                |                          | 0.04                             |                       |
| 1992   | 0                                | 0                     | 0.03                                | 0                        | 0.04                             | 0.022                 |
| 1993   | 0.01                             | 0                     | 0.01                                | 0                        | 0.05                             | 0                     |
| 1994   | 0.01                             |                       | 0.02                                |                          | 0.04                             |                       |
| 1995   | 0.03                             |                       | 0.003                               |                          | 0.03                             |                       |
| 1996   | 0.01                             | 0.007                 | 0.003                               | 0.082                    | 0.02                             | 0                     |
| 1997   | 0.01                             | 0.006                 | 0.003                               | 0.009                    | 0.01                             | 0.027                 |
| 1998   | 0.02                             | 0                     | 0.009                               | 0                        | 0.02                             | 0.018                 |
| 1999   | 0.17                             |                       | 0.007                               |                          | 0.04                             |                       |
| 2000   | 0.012                            |                       | 0.021                               |                          | 0.032                            |                       |
| 2002   |                                  | 0                     |                                     | 0                        |                                  | 0.009                 |
| 2004   | 0.061                            |                       | 0.009                               |                          | 0.047                            |                       |
| 2006   | 0.017                            | 0                     | 0.006                               | 0                        | 0.049                            | 0.005                 |
| <b>Subset of years when both lakes were measured</b>       |                                  |                       |                                     |                          |                                  |                       |
| 1989   | 0.06                             | 0.012                 | 0.003                               | 0                        | 0.02                             | 0                     |
| 1992   | 0                                | 0                     | 0.03                                | 0                        | 0.04                             | 0.022                 |
| 1993   | 0.01                             | 0                     | 0.01                                | 0                        | 0.05                             | 0                     |
| 1996   | 0.01                             | 0.007                 | 0.003                               | 0.082                    | 0.02                             | 0                     |
| 1997   | 0.01                             | 0.006                 | 0.003                               | 0.009                    | 0.01                             | 0.027                 |
| 1998   | 0.02                             | 0                     | 0.009                               | 0                        | 0.02                             | 0.018                 |
| 2006   | 0.017                            | 0                     | 0.006                               | 0                        | 0.049                            | 0.005                 |
| <b>Differences (Broken Bow minus Tenkiller Ferry Lake)</b> |                                  |                       |                                     |                          |                                  |                       |
| 1989   |                                  | 0.048                 |                                     | 0.003                    |                                  | 0.02                  |
| 1992   |                                  | 0                     |                                     | 0.03                     |                                  | 0.018                 |
| 1993   |                                  | 0.01                  |                                     | 0.01                     |                                  | 0.05                  |
| 1996   |                                  | 0.003                 |                                     | -0.079                   |                                  | 0.02                  |
| 1997   |                                  | 0.004                 |                                     | -0.006                   |                                  | -0.017                |
| 1998   |                                  | 0.02                  |                                     | 0.009                    |                                  | 0.002                 |
| 2006   |                                  | 0.017                 |                                     | 0.006                    |                                  | 0.044                 |
| N  |                                  | 7                     |                                     | 7                        |                                  | 7                     |
| Mean   |                                  | 0.015                 |                                     | -0.004                   |                                  | 0.020                 |
| StDev  |                                  | 0.016                 |                                     | 0.035                    |                                  | 0.023                 |
| t-stat   |                                  | 2.3378                |                                     | -0.2926                  |                                  | 2.2522                |
| P-value  |                                  | 0.058                 |                                     | 0.78                     |                                  | 0.065                 |

**Table 7-5. Comparison of largemouth bass catch rates between Broken Bow Reservoir and Tenkiller Ferry Lake**

| Year   | 13–16 in.<br>331–406 mm |            | >16 in.<br>>407         |            | >14 in.<br>≥356 mm (≥10) |            |
|--|-------------------------|------------|-------------------------|------------|--------------------------|------------|
|  | Tenkiller<br>Ferry Lake |            | Tenkiller<br>Ferry Lake |            | Tenkiller<br>Ferry Lake  |            |
|  | Broken Bow              | Ferry Lake | Broken Bow              | Ferry Lake | Broken Bow               | Ferry Lake |
| 1977   |                         | 3.3        |                         | 2.7        |                          | 3.3        |
| 1978   |                         |            |                         |            |                          |            |
| 1980   |                         | 8.1        |                         | 5          |                          | 8.7        |
| 1981   |                         |            |                         |            | 0.8                      |            |
| 1982   |                         | 6.8        |                         | 3.9        |                          | 7.4        |
| 1983   |                         |            |                         |            | 2                        |            |
| 1985   |                         | 13.4       |                         | 1.2        | 2                        | 6.5        |
| 1986   |                         | 12.2       |                         | 4.2        |                          | 8.1        |
| 1987   | 3.1                     | 12.3       | 1.4                     | 3.4        | 2.7                      | 10.8       |
| 1988   |                         | 13.5       |                         | 7.1        |                          | 17.6       |
| 1989   | 10.2                    | 9.5        | 3.4                     | 7.4        | 10.8                     | 15.2       |
| 1991   | 6.5                     | 11.8       | 1.3                     | 9.7        | 4.5                      | 17.8       |
| 1992   | 20                      | 22.5       | 6                       | 7.7        | 14.9                     | 18.2       |
| 1993   | 10.6                    | 31.6       | 5.4                     | 14.4       | 13.4                     | 36.7       |
| 1994   | 7.6                     | 29.8       | 4                       | 20         | 8.9                      | 41.8       |
| 1995   | 13.8                    |            | 9.3                     |            | 18.2                     |            |
| 1996   | 5.8                     | 46         | 2.8                     | 40         | 6.9                      | 74.7       |
| 1997   | 10                      | 29.8       | 10.7                    | 29.8       | 17.6                     | 48         |
| 1998   | 10.3                    |            | 2                       |            | 9                        |            |
| 1999   |                         | 57         |                         | 35         |                          | 79.7       |
| 2000   | 17.3                    |            | 5.7                     |            | 15.7                     |            |
| 2001   | 17.1                    | 37.1       | 5.3                     | 30.8       | 14.3                     | 53.1       |
| 2002   | 27.5                    | 24.6       | 9.5                     | 10.7       | 32                       | 26.9       |
| 2003   |                         | 12         |                         | 11.9       |                          | 21         |
| 2004   | 9.5                     |            | 9.6                     |            | 15.5                     |            |
| 2005   |                         | 31.8       |                         | 18         |                          | 39.3       |
| 2006   | 7.7                     | 26.1       | 3.5                     | 14.9       | 8                        | 34.7       |
| <b>Subset of years when both lakes were measured</b>       |                         |            |                         |            |                          |            |
| 1985   |                         |            |                         |            | 2                        | 6.5        |
| 1987   | 3.1                     | 12.3       | 1.4                     | 3.4        | 2.7                      | 10.8       |
| 1989   | 10.2                    | 9.5        | 3.4                     | 7.4        | 10.8                     | 15.2       |
| 1991   | 6.5                     | 11.8       | 1.3                     | 9.7        | 4.5                      | 17.8       |
| 1992   | 20                      | 22.5       | 6                       | 7.7        | 14.9                     | 18.2       |
| 1993   | 10.6                    | 31.6       | 5.4                     | 14.4       | 13.4                     | 36.7       |
| 1994   | 7.6                     | 29.8       | 4                       | 20         | 8.9                      | 41.8       |
| 1996   | 5.8                     | 46         | 2.8                     | 40         | 6.9                      | 74.7       |
| 1997   | 10                      | 29.8       | 10.7                    | 29.8       | 17.6                     | 48         |
| 2001   | 17.1                    | 37.1       | 5.3                     | 30.8       | 14.3                     | 53.1       |
| 2002   | 27.5                    | 24.6       | 9.5                     | 10.7       | 32                       | 26.9       |
| 2006   | 7.7                     | 26.1       | 3.5                     | 14.9       | 8                        | 34.7       |
| <b>Differences (Broken Bow minus Tenkiller Ferry Lake)</b> |                         |            |                         |            |                          |            |
| 1985   |                         |            |                         |            |                          | -4.5       |
| 1987   |                         | -9.2       |                         | -2         |                          | -8.1       |
| 1989   |                         | 0.7        |                         | -4         |                          | -4.4       |
| 1991   |                         | -5.3       |                         | -8.4       |                          | -13.3      |
| 1992   |                         | -2.5       |                         | -1.7       |                          | -3.3       |
| 1993   |                         | -21        |                         | -9         |                          | -23.3      |
| 1994   |                         | -22.2      |                         | -16        |                          | -32.9      |
| 1996   |                         | -40.2      |                         | -37.2      |                          | -67.8      |
| 1997   |                         | -19.8      |                         | -19.1      |                          | -30.4      |
| 2001   |                         | -20        |                         | -25.5      |                          | -38.8      |
| 2002   |                         | 2.9        |                         | -1.2       |                          | 5.1        |
| 2006   |                         | -18.4      |                         | -11.4      |                          | -26.7      |

**Table 7-5. (cont.)**

| Year    | 13–16 in.<br>331–406 mm |            | >16 in.<br>>407 |            | >14 in.<br>≥356 mm (≥10) |            |
|---------|-------------------------|------------|-----------------|------------|--------------------------|------------|
|         | Tenkiller               |            | Tenkiller       |            | Tenkiller                |            |
|         | Broken Bow              | Ferry Lake | Broken Bow      | Ferry Lake | Broken Bow               | Ferry Lake |
| N       |                         | 11         |                 | 11         |                          | 12         |
| Mean    |                         | -14.091    |                 | -12.318    |                          | -20.700    |
| StDev   |                         | 12.745     |                 | 11.365     |                          | 20.320     |
| t-stat  |                         | -3.6670    |                 | -3.5948    |                          | -3.5289    |
| P-value |                         | 0.0043     |                 | 0.0049     |                          | 0.0047     |